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Statement of Perspective. The word *zygon* means the yoking of two entities or processes that must work together. It is related to *zygote*—meaning the union of genetic heritage from sperm and egg, a union that is vital in higher species for the continuation of advancement of life. The journal *Zygon* provides a forum for exploring ways to unite what in modern times has been disconnected—values from knowledge, goodness from truth, religion from science. Traditional religions, which have transmitted wisdom about what is of essential value and ultimate meaning as a guide for human living, were expressed in terms of the best understandings of their times about human nature, society, and the world. Religious expression in our time, however, has not drawn similarly on modern science, which has superseded the ancient forms of understanding. As a result religions have lost credibility in the modern mind. Nevertheless some recent scientific studies of human evolution and development have indicated how long-standing religions have evolved well-winnowed wisdom, still essential for the best life. *Zygon's* hypothesis is that when long-evolved religious wisdom is yoked with significant recent scientific discoveries about the world and human nature, there results credible expression of basic meaning, values, and moral convictions that provides valid and effective guidance for enhancing human life. *Zygon* also publishes manuscripts that are critical of this perspective, as long as such papers contribute to a constructive reflection on scientific knowledge, human values, and existential meaning.

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Editorial

This issue begins with an Editorial essay by Christopher Harrington, who considers whether the pattern of suffering in the natural world can be reconciled with the expectation that creation reflects perfect benevolence; he argues that widespread suffering is structurally woven into the biological and psychological systems that sustain life.

Below, you will find a brief overview of the articles included in this issue, both in the general articles section and in three thematic sections, as well as an overview of books reviewed in the latest edition of *Reviews in Science, Religion and Theology*.

Articles

This issue contains nine articles in the general articles section. Sevcan Öztürk critically examines the current state of Islamic ecotheology; he argues that, while it has made valuable contributions to environmental thought, it remains largely confined within an ethical paradigm centered on moral responsibility. Jovana Isevska studies how Buddhism is mobilized in Kim Stanley Robinson's *Science in the Capital* trilogy as both a critique of scientific hyperrationality and a resource for ecological ethics; she shows both the possibilities and limitations of Buddhism's role in shaping ecological thought in the United States. Jianxin Liu presents a philosophical paradigm shift grounded in cellular biology, which repositions life, rather than human consciousness, as the ontological and epistemological foundation for understanding and participating in reality; he proposes that this paradigm offers a promising integrative approach to ontology, ethics and stewardship. Markus Lindholm, Erika Lynn Gray, Torbjørn Eftestøl, and Terje Sparby draw on Alfred Russel Wallace, Ernst Haeckel, and Pierre Teilhard de Chardin to describe a metaphysical view on evolution; they emphasize the mystical experience of evolution and give possible implications of evolutionary mysticism for deep ecology and environmentalism. Michael Keas and Paul Gould address "complex specified information" (CSI); they argue that CSI is an important feature of life and a kind of value that all life instantiates; they suggest a value theory (axiology) research program guided by the hypothesis that value itself is best understood as (primarily) normative rarity and show how this approach to axiology can be guided by perspectives derived from the integration of cosmology, biology, and

information theory. Cornelius Hunter studies “cessationism,” a popular Christian doctrine that states that divine miracles, such as recorded in the New Testament, ceased to occur during or shortly after the Apostolic Era; he focuses on the relationship between cessationism and evolutionary thought and argues that cessationism forms a theological substrate upon which several significant evolutionary arguments and traditions were developed. Peter Lund Bullen provides a deep and interdisciplinary analysis of biblical intrinsic value in dialogue with contemporary environmental philosophy; he concludes that the Bible accords with a theocentric, objective, nonhierarchical, intrinsic final value theory, or in other words, that the intrinsic value is dependent on God, is real, does not differ in quantity, and is not reliant on a specific property. Bharath Sriraman compares Lurianic Kabbalah and Rigvedic cosmogony; he concludes that they articulate structurally homologous accounts of observer-instantiated reality and that both traditions articulate “recursive witnessing”—the recognition that observation is not unilateral but mutual, that every observer is simultaneously observed, that consciousness and reality co-constitute each other in an ongoing process without absolute origin or final completion. Finally, Mohammad Modabber Caharborj discusses Web3 ecosystems (the next evolution of the internet) as an emergent field of digital religion where decentralized infrastructures—spanning smart contracts, token economies, and symbolic interfaces—actively generate novel forms of ritual life; he proposes an approach to “distributed rituals analysis” to study these and other ritual forms.

IRAS 2025—Spiritual Experience **(by Calvin Chatlos)**

What if spiritual experience is a real human capacity waiting to be opened and not “just” a belief? Across science, philosophy, and theology, researchers are exploring how people encounter a deeper inner core that can transform awareness and meaning, and improve connection. In the 2025 IRAS conference “Spiritual Experience: A Scientific, Philosophical and Theological Retreat,” organized by Calvin Chatlos and Barbara Whittaker-Johns, perspectives on this topic from science, philosophy, and theology were brought together under a shared framework for discussion and practice. In the conference, we aimed to deepen understanding of how intentional spiritual opening can foster meaning, healing, awe, connection, and planetary well-being. In the December 2024 issue of *Zygon: Journal of Religion and Science*, you can find Calvin Chatlos’ programmatic article on his Framework of Spirituality, which was the driving concept of the conference, as well as three invited pre-conference commentaries from science (Michael Winkelman), philosophy (Nick Hedlund), and theology (Fraser Watts).

Five articles (based on two plenary talks and three contributed papers) are published in this thematic section following the conference. Michael Winkelman (plenary speaker) and Andy Newberg offer a neurophenomenological

perspective on the self and spirituality, with a focus on the right parietal lobe; they claim that the “affective core self” (which can be linked with right-hemisphere processes) corresponds directly to many characteristics of mystical experiences. Andrew Davis (plenary speaker) provides a process philosophy approach to “exceptional experience”; drawing on Whitehead, he addresses the “wild(er)ness of non-sensory perception” and he adds that Iain McGilchrist’s hemisphere hypothesis provides neuroscientific support for Whitehead’s “dual theory of perception.” Chuck Fowler brings another perspective to mental health, with his emphasis on the embeddedness of mental health in systemic health; he argues that systemic thinking is essential for the health of the planet, and to recover from “Systemic Abnormality Disorder.” Lijo Peter Kannothe addresses an ontological hermeneutics of being; by placing the yogic discipline of breath control in dialogue with Meister Eckhart’s mystical theology, he argues that both traditions “converge in affirming that true freedom and peace emerge not from self-assertion but from radical self-emptying and openness to the divine.” Finally, Paul Carr analyzes near-death experiences (NDEs) as spiritual transformations; he concurs with the conviction of one the medical doctors describing NDEs that the current views on the relationship between the brain and consciousness held by most physicians, philosophers, and psychologists are too narrow for a proper understanding and that humans cannot be reduced to their constituent parts.

The Spiritual Dimensions of Science **(by Brandon Vaidyanathan)**

Two articles in this issue form a thematic section on the spiritual dimensions of science. Both articles draw on data from a large qualitative international study of physicists and biologists, the “Meaning and Mystery in Science” study (2024). In the first article, theologian Pui Him Ip develops a typology of six modes of contemplation and examines the variety of ways in which scientific practice might afford occasions for such contemplation. The second article by sociologist Stefano Sbalchiero and psychologist Peter Varga applies mixed-methods lexicometric analysis to examine how religious and nonreligious scientists describe transcendent experiences. They find among nonreligious scientists a form of “contemplative empiricism” where sustained observations yield reflexive moments that the authors term the “empirical sublime.” Among religious scientists, by contrast, they find that scientists process transcendent experiences in science through a “negotiated coexistence” with their faith traditions.

Boyle Lecture 2026

This third thematic section contains the 2026 Boyle Lecture, delivered by Iain McGilchrist under the title “God, the Brain, and the Nature of Truth,” as well as the response by Michael Reiss.

Books reviewed in *Reviews in Science, Religion and Theology*

Reviews in Science, Religion and Theology is a quarterly joint publication of the European Society for the Study of Science and Theology (ESSSAT) and the International Society for Science and Religion (ISSR) and is distributed free to all members of ESSSAT and ISSR. Here is the list of books reviewed in the *Reviews* issue of March 2026:

- Muhammad Yaseen Gada, *Islam and Environmental Ethics*, Cambridge: Cambridge University Press, 2024
- Harold G. Koenig and Charmin M. Koenig, *Nothing More Important: A Book about Faith*, independently published, 2023
- Harris Wiseman, *The Myth of the Moral Brain: The Limits of Moral Enhancement*, Cambridge, MA: MIT Press, 2016

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Editorial

Evolution, Suffering, and the Moral Texture of Creation

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This Editorial essay examines whether the structure of suffering in the natural world is compatible with the expectation that creation reflects perfect benevolence. Drawing on research in evolutionary biology, affective neuroscience, and moral psychology, it argues that suffering is not merely abundant but structurally embedded in the biological and psychological systems that sustain life. Pain systems prioritize threat detection, negative experiences exert disproportionate psychological influence, and many forms of suffering persist despite technological progress in alleviating them. These patterns raise questions about the moral character of the processes through which life has emerged. After examining several theological interpretations—including soul-making theodicy, evolutionary theodicy, and process theology—the essay argues that none fully resolves the tension between the structure of suffering and the idea of a benevolent cosmic order. Rather than concluding with metaphysical pessimism, the article proposes a constructive ethical response: compassion emerges as a deliberate moral stance through which human beings resist the structural harms of the world.



Introduction

The natural world displays remarkable complexity, creativity, and resilience, yet it also reveals pervasive suffering across biological systems. Pain, predation, disease, and mortality appear not as rare anomalies but as persistent features of the processes through which life emerges and sustains itself. This observation raises a long-standing question in philosophy and theology: whether the structure of suffering in the natural world is compatible with the expectation that creation reflects perfect benevolence and therefore exhibits a positive moral valence in the experience of living beings.

Such questions lie at the intersection of scientific inquiry and theological reflection. From its founding, *Zygon: Journal of Religion and Science* has sought to encourage precisely this kind of interdisciplinary conversation. In 1972, Ralph Wendell Burhoe argued that modern scientific knowledge challenges traditional religious interpretations of nature while simultaneously opening new possibilities for constructive dialogue between science and theology. The present essay contributes to this ongoing conversation by examining how contemporary insights from evolutionary biology and moral psychology reshape reflection on the problem of suffering in creation. In this sense, the analysis that follows treats scientific accounts of nature and theological reflection as mutually informative rather than as competing explanatory frameworks.

This question has traditionally been framed as the “problem of evil.” In contemporary discussion, however, the issue increasingly intersects with empirical insights from evolutionary biology, neuroscience, and moral psychology. These fields increasingly suggest that suffering is not merely an accidental by-product of biological systems but is deeply integrated into the mechanisms that enable organisms to survive and reproduce. Pain functions as an adaptive warning signal, fear systems amplify perceived threats, and negative experiences often exert stronger psychological influence than positive ones. Together, these features create what might be described as an affective asymmetry within biological life: suffering is frequently more intense, more urgent, and more evolutionarily consequential than pleasure.

This article explores the theological implications of that asymmetry. The argument does not attempt to prove that the existence of suffering disproves the possibility of divine benevolence. Rather, it examines whether the structural patterns of suffering revealed by contemporary science generate tension with the expectation that the processes of creation reflect perfect moral goodness.

Insights from evolutionary biology and behavioral science provide a useful starting point. Scholars such as Richard Dawkins, Daniel Dennett, Frans de Waal, and Robert Sapolsky have emphasized that natural selection favors traits that enhance survival rather than traits that maximize happiness or minimize suffering (Dawkins 1976; Dennett 1995; de Waal 2016; Sapolsky 2017). From this

perspective, the prevalence of suffering in nature is not surprising: evolutionary processes reward efficiency in survival and reproduction, not moral harmony.

Within contemporary theology, several scholars have attempted to interpret evolutionary processes within constructive theological frameworks. Christopher Southgate (2008), for example, argues that evolutionary creativity and suffering must be understood together as part of the same biological history that produces the diversity of life, while Niels Henrik Gregersen's (2003) concept of "deep incarnation" emphasizes the theological significance of evolutionary continuity between humanity and the wider biological world.

Yet the theological implications of this observation remain contested. Philosophers of religion have also examined the evidential significance of suffering, arguing that patterns of pain and pleasure in the natural world may function as evidence relevant to evaluating the hypothesis of divine benevolence (Rowe 1979; Draper 1989). Some religious thinkers argue that suffering plays a necessary role in moral or spiritual development. Others propose that evolutionary processes represent a form of divine creativity unfolding through risk and contingency. Still others suggest that the presence of suffering reveals limits in the concept of divine power or benevolence.

The present essay examines these possibilities while focusing on a specific claim: that suffering appears not merely as a contingent feature of life but as a structural element of the biological systems through which life evolves. Understanding this structural dimension helps clarify why the problem of suffering remains a persistent challenge for theological interpretations of creation.

Evolutionary Origins of Suffering

Biological evolution operates through natural selection acting on variation within populations. Traits that increase an organism's ability to survive and reproduce tend to persist across generations. Within this framework, mechanisms that detect danger and motivate rapid responses to threat provide a significant adaptive advantage.

Among the most fundamental of these mechanisms is the biological capacity for pain. In vertebrates and many invertebrates, nociceptive systems detect tissue damage and trigger behavioral responses that reduce further injury. From an evolutionary perspective, the function of pain is not to produce suffering for its own sake but to create an urgent signal that directs attention toward potential harm.

However, systems that efficiently detect danger often operate with a bias toward caution. Missing a real threat may have catastrophic consequences, whereas responding to a false alarm typically carries a smaller cost. As a result, natural selection frequently favors hyper-vigilant threat detection systems. Evolutionary behavioral research similarly suggests that natural selection

favors threat-detection systems that minimize fatal errors even at the cost of heightened sensitivity to potential dangers (Nesse 2005). This bias increases the probability that organisms will over-respond to possible dangers rather than fail to respond when genuine threats arise.

The asymmetry between threat detection and reward processing extends into human psychology. Research in cognitive and affective neuroscience consistently finds that negative experiences exert stronger and more durable effects than positive ones. Fear memories are often more persistent than pleasurable memories, and aversive stimuli tend to command greater attention in perception and decision-making. Psychologists sometimes refer to this pattern as the negativity bias, a tendency for negative events to have greater psychological weight than positive ones (Baumeister et al. 2001). In this sense, biological experience appears characterized by a broader pattern of affective asymmetry in which negative states are often more frequent, longer lasting, and behaviorally more influential than positive ones.

From an evolutionary perspective, this bias is understandable. Organisms that quickly recognize danger are more likely to survive long enough to reproduce. Yet the same bias can produce a world in which suffering exerts a disproportionate influence on conscious experience. These dynamics suggest that suffering arises not merely from occasional failures in biological systems but from the very mechanisms through which those systems operate.

Structural Suffering in Evolutionary Systems

The structural role of suffering becomes particularly visible when examining certain ecological and evolutionary strategies. In many species, reproductive success depends upon processes that involve intense competition, predation, or the exploitation of other organisms.

A frequently discussed example appears in parasitoid insects, including certain species of wasps. These organisms lay their eggs inside or upon a host organism—often a caterpillar or other insect. The developing larvae consume the host from within, eventually killing it as they mature. From the perspective of evolutionary biology, this strategy is highly effective: it provides a reliable source of nourishment for the developing offspring. Yet it also illustrates how evolutionary processes can generate life cycles in which suffering plays a central functional role.

A different example appears in brood parasitism among birds such as cuckoos. Some cuckoo species lay their eggs in the nests of other birds, leaving the host species to raise the cuckoo chick. In several well-documented cases, the newly hatched cuckoo instinctively pushes the host's eggs or chicks out of the nest, ensuring that it receives all available parental care. This behavior dramatically increases the cuckoo's survival prospects but results in the death of the host's offspring.

Examples such as these suggest that suffering is not merely incidental within evolutionary systems. Instead, evolutionary competition can produce strategies in which the success of one organism depends directly upon the harm or death of another. While such processes contribute to the diversity and resilience of ecosystems, they also raise difficult questions about how the natural world should be interpreted from a moral or theological perspective.

Why Structural Suffering Raises Theological Tension

The aforementioned examples illustrate a central feature of evolutionary systems: suffering frequently arises not from accidental malfunction but from mechanisms that contribute directly to biological success. Pain, predation, and mortality are not peripheral elements of life's history. They are woven into the processes through which organisms survive, compete, and reproduce. These observations give rise to a distinctive form of theological tension. Philosophers of religion have explored closely related arguments within discussions of the evidential problem of evil, where the distribution and intensity of suffering are interpreted as potential evidence against perfectly benevolent divine governance (Rowe 1979; Draper 1989).

Traditional discussions of the problem of evil often focus on particular events—natural disasters, diseases, or acts of violence—that appear morally troubling. Such events might be interpreted as consequences of human freedom, as temporary disruptions within an otherwise benevolent order, or as conditions necessary for moral development. Yet the evolutionary patterns described suggest that suffering operates at a deeper level. Many forms of harm occur not despite the functioning of natural systems but precisely because those systems function effectively.

In evolutionary biology, competition for limited resources shapes the development of species across vast stretches of time. Predation regulates populations, parasitic relationships evolve in complex ecological networks, and reproductive strategies frequently involve high rates of mortality among offspring. Marine species, for example, often produce thousands or even millions of eggs, the vast majority of which perish before reaching maturity. This pattern is not the result of failure within biological systems but a strategy through which populations maintain stability within dynamic ecosystems.

If suffering arises from such structural processes, the challenge for theology becomes more fundamental. The issue is no longer simply that individual organisms experience pain but that evolutionary mechanisms generating biodiversity and ecological balance may also depend upon patterns of harm. In this sense, suffering appears embedded within the very dynamics that allow life to flourish.

Recognizing this structural dimension does not logically disprove the possibility of divine benevolence, but it does sharpen the question of how

such benevolence might be understood. Theological interpretations may still propose that evolutionary processes serve purposes beyond immediate human understanding. Nevertheless, the prevalence of suffering within evolutionary systems raises questions about the moral character of the creative processes through which life emerges. The tension arises not from isolated events but from the observation that suffering functions as a structural feature of the natural world.

Theological Responses

Theological traditions have long grappled with the question of suffering in creation. Several influential approaches attempt to reconcile the persistence of suffering with belief in a benevolent divine reality. While these perspectives offer valuable insights, each faces challenges when considered in light of the structural patterns described.

One influential response is the soul-making theodicy, associated most prominently with John Hick. According to this view, the presence of suffering creates conditions in which moral and spiritual development become possible (Hick 1966). A world containing risk, struggle, and uncertainty provides opportunities for courage, compassion, and moral growth that would not exist in a perfectly comfortable environment.

While the soul-making approach highlights the potential ethical value of adversity, its explanatory scope may be limited when applied to nonhuman suffering. Much of the suffering within evolutionary history occurs among animals whose experiences cannot plausibly be interpreted as contributing to moral or spiritual development. The immense scale of animal suffering across geological time therefore raises questions about whether soul-making alone can account for the broader structure of suffering within nature.

A second perspective attempts to integrate evolutionary science more directly into theological reflection. Evolutionary theodicy suggests that natural selection may represent a form of divine creativity unfolding through processes of emergence, contingency, and self-organization (Southgate 2008). Within this framework, evolutionary struggle becomes the means through which the diversity and complexity of life gradually arise.

This approach acknowledges the central role of evolutionary mechanisms while seeking to interpret them within a theological narrative of creative development. However, critics note that it can remain difficult to explain why evolutionary creativity appears to depend upon such extensive suffering. If the emergence of complex life requires processes involving widespread predation, competition, and mortality, questions remain about whether these conditions are compatible with perfect benevolence.

A third perspective emerges from process theology, which emphasizes the dynamic and relational nature of reality. In this view, divine power does not

operate through unilateral control but through persuasive influence within an evolving universe (Whitehead [1925] 1964; Griffin 1976). Because the world possesses genuine autonomy, suffering arises from the interaction of independent processes rather than from direct divine intention.

Process theology offers an important reinterpretation of divine action, suggesting that the persistence of suffering reflects the open and unfinished character of the cosmos. Nevertheless, some critics argue that this framework redefines divine power in ways that diverge significantly from traditional conceptions of omnipotence. While the process perspective may alleviate certain tensions, it also raises new questions about the extent of divine influence within the natural world.

Taken together, these theological approaches demonstrate the richness of contemporary reflection on suffering. Yet none fully eliminates the tension created by the structural role of suffering in evolutionary systems. The persistence of this tension invites further exploration of how moral meaning might be understood within a world shaped by such processes. Recent scholarship has also focused specifically on the theological implications of animal suffering within evolutionary history, arguing that traditional doctrines must be reconsidered in light of the immense scale of nonhuman suffering across geological time (Sollereder 2019).

Compassion as Defiance

If the natural world contains structural patterns of suffering that resist simple theological explanation, the question remains how human beings should respond ethically to this reality. One possibility is to understand compassion as a moral response that emerges precisely within a world marked by vulnerability.

Human moral psychology appears deeply shaped by capacities for empathy and care. Studies in primate behavior and social cognition suggest that forms of empathy and prosocial behavior have evolutionary roots extending beyond the human species (de Waal 2016). These capacities allow organisms to recognize distress in others and respond with protective or cooperative behavior.

Within human societies, compassion often motivates efforts to alleviate suffering through medicine, social institutions, and humanitarian action. Advances in medical science, public health, and animal welfare illustrate how moral concern can gradually reshape aspects of the environment in which suffering occurs. While such efforts cannot eliminate suffering entirely, they demonstrate the capacity of moral communities to reduce certain forms of harm.

From this perspective, compassion may be understood not simply as a passive emotional reaction but as a deliberate ethical stance. To act compassionately is to recognize suffering as morally significant and respond in ways that seek to mitigate its effects. In a world where evolutionary processes do not guarantee

moral harmony, compassion represents a form of resistance against the harshness embedded in natural systems.

This interpretation does not require metaphysical pessimism about the universe. Instead, it acknowledges that moral meaning may arise within human communities even when the broader processes of nature remain morally ambiguous. Compassion thus becomes an expression of moral agency through which human beings participate in reshaping the conditions under which life unfolds.

Planetary Vulnerability and Moral Responsibility

Contemporary environmental challenges underscore the continuing relevance of these questions. Climate change, biodiversity loss, and ecosystem disruption reveal the vulnerability of life within planetary systems that are both resilient and fragile. Scientific research increasingly demonstrates how human activity can intensify forms of suffering across ecological networks, affecting both human societies and nonhuman species.

These developments place new emphasis on the ethical responsibilities associated with technological power. If human beings possess the capacity to influence global ecological systems, moral reflection must consider how that influence should be exercised. The recognition of planetary vulnerability therefore expands the scope of compassion beyond interpersonal relationships to include responsibility for the broader community of life.

Within this context, scientific understanding of ecological systems can deepen rather than diminish moral concern. Awareness of the intricate interdependence among species highlights the significance of actions that protect or degrade environmental stability. Ethical reflection on suffering thus becomes inseparable from the challenge of sustaining conditions that allow life to flourish.

Conclusion

The natural world presents a complex moral landscape. Evolutionary processes generate remarkable biological diversity and resilience, yet they also produce patterns of suffering embedded within the mechanisms through which life evolves. Pain, predation, competition, and mortality are not merely accidental features of nature but structural elements of many ecological systems.

This observation does not demonstrate that divine benevolence is impossible. Theological traditions offer a range of interpretations that attempt to integrate suffering within broader narratives of creation and meaning. Nevertheless, the structural character of suffering revealed by contemporary science creates enduring tension for interpretations that portray the natural world as the product of perfect moral goodness.

Recognizing this tension may encourage a more nuanced understanding of moral responsibility. Rather than assuming that the structure of the world already reflects perfect benevolence, human beings may understand compassion as an ethical response that arises within a morally complex environment. Through acts of care, protection, and solidarity, individuals and communities participate in efforts to reduce suffering and sustain conditions in which life can flourish.

In this sense, the presence of suffering does not extinguish moral meaning. Instead, it provides the context within which compassion becomes both necessary and transformative.

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Competing Interests

The author declares that they have no competing interests.

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Islamic Ecotheology and the Anthropocene Challenge: Ethical Limits and Theological Possibilities

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This article critically examines the current state of Islamic ecotheology and argues that, while it has made valuable contributions to environmental thought, it remains largely confined within an ethical paradigm centered on moral responsibility. As a result, Islamic ecotheology has yet to develop a theologically grounded understanding capable of addressing the challenges of the Anthropocene. The article identifies three interrelated tendencies that shape the field today: (1) an anthropocentric orientation, in which the human being is framed through moral function rather than theological depth; (2) a responsibility-based functional anthropology that limits reflection on the human's ontological status within creation; and (3) an apologetic tone that tends to defend rather than critically expand the discourse, often remaining detached from the broader intellectual context of the Anthropocene. These tendencies, taken together, reveal the absence of a coherent theological anthropology capable of engaging the challenges of the Anthropocene. The article therefore calls for a shift of focus along two main dimensions. First, a shift in content: the construction of a theological anthropology that moves beyond functional categories of responsibility, and second, a shift in rhetoric: the adoption of a comparative method as an integral part of Islamic ecotheology.



Introduction

This article aims to identify the limitations of the current ethical framework of Islamic ecotheology, to justify why these should indeed be regarded as limitations, and to indicate possible pathways for the further development of the field. It should be noted that the aim of this article is not to reject ethics or deny the important role of environmental ethics in shaping Islamic environmental discourse. Rather, it argues that while ethical reflection is essential, approaching today's ecological challenges from a merely ethical perspective is insufficient for generating new ideas or engaging meaningfully with contemporary debates about the future of creation. It is hoped that recognizing this limitation will help resituate ethics within a broader theological framework.

In the past few decades, Muslim scholars have sought to formulate an Islamic view of nature, and of the human–nature relationship largely in response to growing ecological concerns. Beginning with pioneering figures like Seyyed Hossein Nasr in the 1960s and expanding through the works of scholars like S. Nomanul Haq, Mawil Izzi Dien, Ibrahim Özdemir, Fazlun Khalid, and others, this field has established important conceptual foundations. The various approaches presented by Muslim scholars in response to contemporary ecological issues can be classified as “Islamic ecotheology” a field that includes theological reflections seeking to articulate Islamic perspectives on the relationship between God, humanity, and the natural world in the context of contemporary ecological crisis.

Today, Islamic ecotheology constitutes a substantive body of scholarship with its own terminology and internal coherence. However, this article contends that while Islamic ecotheology has made important contributions, it remains largely shaped by an ethical framework grounded in an underdeveloped understanding of the human being. This has given rise to a functionalist view that defines the human being primarily in terms of moral responsibility. This ethical framework limits deeper theological reflections on the ontological status of the human being in relation to creation and the divine. As a result, Islamic ecotheology has yet to develop a theological account capable of addressing the complex challenges of the twenty-first century. The Anthropocene, a new geological epoch proposed in the early 2000s that is defined by human impact on Earth's systems, poses new challenges and questions for theological reflection, including within Islamic thought. The concept urges us to rethink not only human responsibility but also broader aspects of the relationship between humanity and the natural world. In other words, the Anthropocene has brought a paradigmatic shift in how we understand the relationship between human beings and the Earth. In its current form, as this article argues, Islamic environmental discourse is incapable of contributing to the overall theological task of reimagining the human–nature relationship in the Anthropocene.

More specifically, this article advances three claims:

1. Islamic ecotheology has been primarily shaped by an ethical framework focused on moral responsibility toward nature
2. this framework lacks a theologically grounded account of humanity and its ontological status within creation
3. consequently, Islamic ecotheology remains insufficiently equipped to address the deeper theological and anthropological questions raised by the Anthropocene.

It should be highlighted at this point that the field of Islamic ecotheology, as it has developed in international academic discourse, has been primarily shaped by a small number of contributors writing in English, whose works have developed its dominant conceptual vocabulary and general frameworks. While numerous scholars have written on Islamic environmental themes, sustained systematic engagement remains rare. Despite the growing body of literature, most contributions come from scholars who have authored only one or two articles on ecological themes, often without pursuing a comprehensive theological project. This fragmentation results in a scattered body of literature, marked by a lack of depth or continuity. As a result, it becomes particularly difficult to identify any figures who can be clearly entitled as ecotheologians in a sustained or systematic sense. This article primarily focuses on the works of scholars who have contributed to the field with a more sustained body of literature and played a central role in developing an Islamic ecotheological terminology, such as S. Nomanul Haq, Mawil Izzi Dien, Ibrahim Özdemir, and Fazlun Khalid. Other figures, such as Ziauddin Sardar and Parvez Manzoor, are referred to where they offer particularly significant contributions. Although Nasr was among the first to introduce ecological issues and concepts into Islamic thought with his foundational works, he arguably remains an exception rather than a representative example of Muslim ecotheological discourse. Unlike later Muslim environmentalists, Nasr's arguments include a theologically grounded anthropology that is embedded in his comprehensive metaphysical system. Because of this exceptional status, he is not the focus of this article, which examines the recurring themes and tendencies that shape the more representative body of Islamic environmental discourse. Although the reasons his metaphysical and anthropological direction has not been widely adopted within the mainstream discourse need further discussion, his perspectives remain essential for future constructive developments in the field.

This article is written from within contemporary Islamic theological discourse, adopting a critical and constructive perspective that remains open to dialogue with broader theological and interdisciplinary debates shaped by

the Anthropocene. Methodologically, this study employs a critical–theological approach grounded in Islamic sources and discourse analysis, aiming to identify the key themes, corresponding arguments, and rhetorical tendencies of Islamic ecotheology and evaluate their relevance for contemporary theological reflection. While the central claim is outlined early on, the argument develops inductively: by critically examining the foundational concepts and dominant ethical framings of Islamic ecotheology, the article demonstrates that the discourse remains largely confined within an ethical paradigm centered on moral responsibility. As mentioned, the aim is not to dismiss the ethical contributions of Islamic ecotheology. It is to argue that the Anthropocene calls for a deeper theological framework that extends the existing discourse and is grounded in theological anthropology. I use theological anthropology here in its widest and most inclusive sense, referring to theological accounts of the human being in relation to God and creation. Even a minimal yet systematic formulation of such an anthropology would represent a significant step forward for Islamic ecotheology. However, such a framework is still largely absent in contemporary Islamic environmental discourse.

To develop the arguments explained, the article proceeds in three steps: first, it offers a critical overview of the current state of Islamic ecotheology, identifying the key themes and concepts in the field. Second, it explores the limitations of the dominant ethical–functional framework of Islamic environmental discourse and its rhetorical tendencies in light of the challenges posed by the Anthropocene. Third, as a conclusion, it outlines possible directions and shifts for advancing Islamic ecotheology by building on its existing foundations while addressing current deficiencies within today’s broader intellectual and planetary context.

Key Concepts and Corresponding Arguments in Islamic Ecotheology

Environmental movements that emerged in the second half of the twentieth century raised questions about the origins of the ecological crisis. Although early discussions on environmental concerns did not explicitly draw on theological or religious frameworks, as explorations of the root causes of the crisis deepened, the need for theological engagement became increasingly apparent (Öztürk 2023, 17). Particularly after Lynn White’s (1967, 155) thesis arguing that the root causes of the ecological crisis are predominantly theological, a wave of scholarly engagement began to explore how religious worldviews have shaped human attitudes toward nature.

In parallel with the emergence of global environmental awareness, environmental concerns within Islamic thought were first raised in the 1960s through the work of Nasr. Nasr was among the earliest intellectuals to address environmental degradation as both a philosophical and theological issue. His lectures delivered at the University of Chicago in 1966, later published as *The*

Encounter of Man and Nature in 1968, marked a turning point in introducing contemporary environmental questions into Muslim scholarly discourse (Nasr 1968). However, for almost a decade after the publication of Nasr's lectures, environmental concerns did not seem to appear as a central theme in Islamic intellectual discussions. In the 1980s and early 1990s, discussions of an Islamic conception of nature and the human–nature relationship were often situated within the broader context of the dialogue between religion and science. This framing reflected efforts to reconcile Islamic metaphysical teachings with emerging ecological challenges from an epistemological perspective (Wersal 1995, 456–58).

This decade also witnessed the emergence of a Qur'anic terminology aimed at articulating the relationship between Islam and environmental issues. In addition to the leading works of Nasr, Parvez Manzoor (1984, 155–62) offered one of the earliest systematic attempts to articulate “some metaphysical and philosophic principles governing the environmental ethics of Islam.” His article can be considered one of the earliest attempts at developing a Qur'anic terminology for understanding the human–nature relationship. Another important voice in the development of Islamic ecological discourse during this period is Ziauddin Sardar (1985, 218–37), who contributed to the construction of an Islamic environmental vocabulary, particularly through his emphasis on epistemology and moral discourse. However, Sardar's scholarly interests led him more toward critiques of modernity and Western science and culture rather than a further theological or metaphysical engagement with ecological concerns. In the 1990s and the years that followed, prominent figures such as Fazlun Khalid, Mawil Izzi Dien, S. Nomanul Haq, and Ibrahim Özdemir contributed significantly to the emerging Islamic environmental discourse. All emphasized that addressing the ecological crisis requires the development of an ethical system rooted in the Qur'an. With this aim in mind, scholars began to develop and reinterpret Qur'anic concepts to articulate the value of nature and define the human–nature relationship within an Islamic worldview.

One of the most distinctive characteristics of Islamic environmental discourse throughout this formative period was its development of a rich terminology and set of arguments, most of which are derived from the Qur'an. In this context, a key theological concept is *tawhīd* (divine unity), the Qur'anic expression that defines the oneness of God and the central pillar of Islam. While *tawhīd* is by no means unique to the ecotheological discourse, its reinterpretation in environmental thought serves to ground ecotheological discourse in a metaphysical vision of unity. This means that *tawhīd* is often used in Islamic environmental discourse to highlight the interconnectedness of all creation under God's sovereignty (Khalid 2002, 338; 2010, 710–11; 2017, 135; 2019, 163–64; Manzoor 1984, 155; Izzi Dien 2000, 72–74; Özdemir 2003, 4).

Alongside *tawhid*, several Qur'anic concepts articulate the role and meaning of nature. The concept of *āyāt* (signs) refers to natural phenomena as signs pointing to God's creative power. This concept is frequently used to describe the role of the natural world as directing the human being toward contemplation of God, His existence, and His divine attributes. Therefore, nature becomes a visible sign that points beyond itself, inviting reflection on the existence and attributes of God (Haq 2001b, 146; Khalid 2017, 133; Özdemir 2003, 9–10; Sardar 1985, 226; Izzi Dien 1997, 48). Another key Qur'anic concept explaining the meaning and role of nature is *mīzān* (balance). It is used to imply that all creation is created with an inherent harmony as a universal law of God, and that there is an immanent order and purpose in the creation (Khalid 2003, 316; 2017, 316; Özdemir 2003, 8–10). Finally, the concept of *fiṭra* describes the primordial nature of all creation and denotes the original and natural state of purity, which applies to all of creation (Khalid 2017, 131; 2019, 164). Together, these concepts portray nature as part of a sacred system that is a balanced and pure manifestation of the divine and directs the attention of the human being toward God.

Among the key concepts that highlight the human dimension of the human–nature relationship is the Qur'anic concept of *ḵhalīfa* (vicegerent). Muslim ecotheologians typically interpret vicegerency in terms of human responsibility: human beings uniquely hold the divinely ordained responsibility of environmental protection due to their special role as vicegerents of God on Earth (Özdemir 2008, 167–69; Khalid 2017, 10–11; 2019, 164–65; Izzi Dien 1990, 191; 2000, 74–79). In this framework, human beings, as God's vicegerents, are entrusted with the task of maintaining the balance embedded in creation and refraining from actions that disrupt this divinely ordained harmony (Izzi Dien 1990, 192; Haq 2001b, 147; Özdemir 2003, 13–14). Vicegerency is usually accompanied by the concept of *amāna* (trust), which emphasizes that the Earth and all it contains have been entrusted to humanity by God (Khalid 2019, 165). As Manzoor (1984, 156–57) explains the concept in light of the Qur'anic verses: “Man has, of his own accord, accepted nature as a trust (*amana*) and a theatre of his moral struggle. Heavens, earth and mountains refused to assume this responsibility, which man took upon himself voluntarily.” Muslim ecotheologians emphasize that the role of vicegerency does not imply domination over nature but rather signifies a position of responsibility grounded in moral and spiritual accountability. Since the role of the human being is “to preserve, protect, and promote their fellow creatures” (Izzi Dien 1990, 191–92), the human being is “the guardian in the role of the slave” of God (Khalid 2003, 317). Khalid (2017, 138) further writes on the role of *ḵhalīfa* on Earth: “We are called to care for and manage the Earth in a way that conforms to God's purpose in Creation: it should be used for our benefit without causing harm to the other inhabitants of planet Earth, which are communities like ourselves . . . The relationship we have

with the natural world is not a right to do with as we please, but a responsibility that carries with it accountability.”

Two Qur’anic principles in Islamic environmental discourse are *‘adl* (justice) and *iḥsān* (beauty, kindness, excellence), which define the character of human behavior toward nature. As God’s vicegerent, the human being is expected to act in accordance with the principles of *adl* and *iḥsan* in all interactions with creation (Khalid 2017, 11; 2019, 165; Izzi Dien 1990, 190; 1997, 49). Khalid (2017, 138–39) highlights this principle: “The discharge of our responsibilities should be tempered by justice and kindness with the intention always to do good. This is *iḥsan*, doing what is pleasing to Allah.” In this framework, justice and kindness are not only ethical values but also theological imperatives that shape the human relationship with the natural world. The highest form of moral responsibility in this context is to act justly and beautifully in one’s engagement with creation.

The main themes and corresponding arguments of Islamic environmental discourse show that Islamic ecotheology integrates theological, ethical, and metaphysical dimensions, framing the human being as a responsible agent. The role of the human being in this framework is defined by divine trust, cosmic balance, and moral excellence. Therefore, the concept of the human being as *khalifa*, entrusted with *amana* and guided by principles such as *adl* and *iḥsan*, is central to Islamic ecotheological discourse. Yet these formulations often serve as both the starting point and the end point of the discussion. As a result, the human role is typically defined in ethical terms such as “responsibility” and “accountability” but rarely examined more deeply at the levels of theological anthropology or in terms of a metaphysically grounded ontology. The ontological foundations of responsibility therefore remain largely unexplored. An important exception is Nasr, who seeks to ground responsibility in a broader metaphysical foundation. However, his attempt remains an isolated case in the overall Islamic environmental discourse. The broader discourse is limited by its tendency to repeat earlier arguments, particularly regarding the human role. As a result, Islamic ecotheology remains largely confined to an ethical framework. This terminology and framework represent a meaningful contribution in the formation period; however, a closer examination reveals certain limitations in the way they are currently employed. Such limitations become more evident, particularly in the capacity of this ethical framework that defines Islamic ecological discourse to engage the existential and systemic challenges of the Anthropocene, where the human is not just a caretaker but the principal geological force reshaping the planet. Addressing these limitations is particularly essential if the field of Islamic ecotheology is to develop further. The task of the next section is to examine the shortcomings of this purely ethical paradigm in Islamic ecotheology in relation to contemporary planetary realities.

The Anthropocene Context and the Limits of Ethical Response

To understand the limits of a purely ethical response, it is necessary to situate the human being within the major phases of the history of life on Earth, which has been defined by successive geological epochs. These epochs have shaped the environmental conditions in which living beings have emerged and developed. The Holocene epoch, which began about 12,000 years ago, provided the stable climatic conditions that allowed human civilizations to flourish. In this epoch, human beings were subjects within nature (Monastersky 2015, 145). By contrast, the early twenty-first century has revealed that we are now living in a new geological epoch known as the Anthropocene. In contrast to the relatively stable conditions of the Holocene, the Anthropocene is characterized by the fact that human activity has become the dominant force shaping planetary systems, including climate regulation, biodiversity, and ocean chemistry (Zalasiewicz et al. 2010, 2228–31). As part of this shift, the Anthropocene has brought its own contexts and questions that challenge the traditional paradigms of the social sciences and humanities, as Clive Hamilton (2017, 85) rightly suggests. This particular case also applies to theology, understood as a discipline deeply engaged with the humanities. In what follows, I examine first the shift in how the human–nature relationship is being approached in light of the Anthropocene and the scientific knowledge that has emerged alongside it. Second, I question the extent to which Islamic ecotheology, in its current form, is adequately equipped to engage with the theological and anthropological questions raised by this new epoch. The broader aim is to demonstrate that a framework grounded solely in ethics fails to capture the full depth of the crisis we now face.

Although humans have long impacted Earth's systems, the term "Anthropocene" was proposed by atmospheric chemist Paul Crutzen (2002) in early the 2000s to mark the unprecedented scale and speed of anthropogenic change. Since its introduction, the concept has become central in interdisciplinary efforts to understand the human role in Earth's system dynamics and the extensive implications of that role for planetary futures. It is important to note that the Anthropocene has not yet been formally recognized as a geological epoch within scientific bodies. Moreover, a range of alternative framings, such as the Capitalocene, the Plantationocene, and Donna Haraway's (2015) more recent proposal of the Chthulucene have been introduced to highlight the social, political, economic, and multispecies dimensions of the current planetary condition. Therefore, in this article, "Anthropocene" is employed not as a precise stratigraphic term but as a conceptual and scientific recognition that captures the extraordinary scale of human impact on Earth's systems.

This article aims to highlight three characteristics of the Anthropocene based on definitions of the term. First, the concept of the Anthropocene highlights one certain issue with the human activities on Earth, namely, the cumulative impact of human activity on Earth's systems and the potentially

catastrophic outcomes of this impact. As Michael Northcott (2018) highlights, the fundamental scientific assertion behind the concept of the Anthropocene is that human interventions in the Earth's systems—such as the atmosphere, oceans, land, and species—have limits. If these limits are exceeded, humanity risks destabilizing the environmental conditions that sustain human life and history (Northcott 2018, 26). This insight helps clarify the evolving relationship between the long-standing planetary crisis identified by environmental thinkers since the 1960s and the more recent concept of the Anthropocene. While the Anthropocene cannot be reduced to the ecological crisis alone, it reveals that the crisis has entered a qualitatively new stage. In other words, the Anthropocene changes our comprehension of today's ecological situation (Bonneuil and Fressoz 2016, 30).

Second, this stage may not be a temporary situation but an enduring condition. Hamilton's (2017, 43) formulation—"there is no going back to the Holocene"—highlights this clearly. For this reason, Christophe Bonneuil and Jean-Baptiste Fressoz claim that calling the current ecological situation a "crisis" is problematic, as it implies a temporary problem we can eventually solve and move on from. However, the field of Earth system science shows that the Anthropocene is not a temporary process; it is "our new condition" (Bonneuil and Fressoz 2016, 238). This raises questions about human power and control in contemporary environmental situations. It also implies limitations of the function and role of the human being and the human species in the future of the Earth (Hamilton et al. 2015, 5).

Third, and arising from the previous two points, the Anthropocene calls for a rethinking of the human–nature relationship and what it means to be human. There is broad consensus that the human being is the primary agent behind both the ecological crisis and the Anthropocene. In this sense, the crisis is not only environmental but also anthropological. It calls for urgent theological reflections on the relationship between humanity and nature, what it means to be human, and, as Ernst Conradie (2016, 2) puts it, "the place of humanity within the earth community." Yet the context in which we now address these reflections has been transformed by the Anthropocene. The scientific research it has inspired has brought about a paradigm shift in how the ecological crisis is understood, both in scale and in consequence. As Northcott rightly argues, the assertion that humanity is now living in the Anthropocene is not merely a historical or scientific claim. It also marks a shift away from "nineteenth-century ecological science and the related rise of environmentalism" (Northcott 2018, 22). In other words, the Anthropocene situation urges us to rethink both the natural world and the human being in a way that earlier paradigms did not essentially require, because it has shown that human beings are no longer just moral agents but also geological agents. This shift has profound implications for theology. The scale of human influence now forces theology to engage in a

multidimensional reflection that moves beyond moral categories toward deeper ontological, metaphysical, and theological engagement. This situation leads to a vital conclusion: any meaningful reflection on the ecological issues in the Anthropocene must interrogate not just what the human being ought to do but what the human being can do and what the human being is in relation to nature, creation, and the divine.

These arguments are supported by the broader intellectual context of the Anthropocene. In the Anthropocene, the contemporary intellectual landscape is marked by major shifts such as posthumanism, new materialism, transhumanism, critical Anthropocene studies, and evolutionary theory. Each of these is increasingly reshaping debates about what it means to be human, presenting new challenges and arguments with growing influence. This inevitably raises new questions regarding the role of the human being among all creatures. Without well-developed theological anthropologies, theological investigations that assign humanity a particular position risk not being able to actively engage with these shifts. Within this context, ethical principles play central roles in any reflection about the human–nature relationship. Alongside these recent debates, ethical reflection on the human–nature relationship has already developed into the field of environmental ethics, which revolves around two central questions: “What duties do humans have with respect to the environment, and why?” (Cochrane n.d.). In the context of the Anthropocene, the human being is not merely a moral agent but an ontological force shaping and transforming planetary systems, often without conscious intent or ethical deliberation. This raises questions about the capacity of environmental ethics to address such a reality. As Hamilton et al. (2015, 8) clearly note, the endeavor to contextualize such a huge event only through ethical considerations trivializes it, reducing it to merely another environmental issue. This claim does not diminish the value of environmental ethics but rather emphasizes that ethical principles should be revised in light of the specific conditions of the Anthropocene. As Markus Vogt (2018, 235) observes, the Anthropocene situation calls for an ethics that “not only formulates rules to protect aspects of nature . . . but also seeks to understand what it means to be human within natural and cultural contexts.” One certain point the Anthropocene has shown is that human beings may not be fully in control, “despite our impact on the planet’s present situation” (Henriksen 2023a, 319). All of this highlights that approaching the current critical environmental situation only through ethical categories risks overlooking the complexity of the human role and existence. Ethics tells us what the human being ought to do, but it often assumes a stable understanding of what the human being is. To reduce the role of the human being on Earth to a limited moral mode, such as steward, trustee, guardian, or caretaker, risks producing a mechanistic or merely functionalist anthropology that fails to capture the depth,

contradictions, and creative–destructive potential of the human condition, especially in the Anthropocene.

Islamic ecotheology, as it has emerged over the past few decades, has made important contributions, especially by foregrounding the ethical responsibility of human beings toward the environment through the two central questions of environmental ethics mentioned. The responses to these questions are strikingly consistent: the duty of the human being is to protect nature and preserve its inherent balance because human beings are the vicegerents of God on Earth. However, this consistency also makes it clear that the field remains largely confined within environmental ethics, which limits its further philosophical, theological, metaphysical, and anthropological scope. As the analysis of key concepts and arguments in the previous section reveals, there are several recurring patterns in how nature, humanity, and their relationship are theologically framed. While these concepts, such as *ayat*, *khalifa*, and *amana*, are drawn from rich Qur’anic and classical sources, their contemporary use tends to reflect certain thematic tendencies in its concerns, tone, and focus.

To better understand the limitations of the ethical framework that defines the present state of Islamic ecotheology, this article examines both the content and tone of current Islamic environmental discourse. I identify three tendencies of Muslim scholars shaping the field that have come to define Islamic ecotheology today. Each of these tendencies reflects, in different ways, the ethical orientation that currently shapes the field, and each raises critical questions about the capacity of Islamic ecotheology to engage the deeper challenges of the Anthropocene. The first and second tendencies, namely anthropocentric orientation and responsibility-based functionalist anthropology are content driven, concerned with how the human being and nature are conceptualized. The third, namely, apologetic tone, is tonal, shaping how the discourse positions itself rhetorically and theologically. While each has its own dynamic, all are shaped, either directly or indirectly, by the dominant ethical framework that currently defines much of Islamic ecotheology.

Anthropocentric Orientation

A characteristic feature of Islamic ecotheology is its anthropocentric orientation, that is, a human-centered focus evident in its theological framings and interpretations of the human–nature relationship. Returning to the previous section, we see that the central concern of Islamic environmental discourse is not God or human beings as such but rather the moral imperative to care for nature due to its inherent value. While nature may appear central, nearly all key concepts are defined in direct or indirect relation to the human being. The human being, as God’s only vicegerent on Earth, is charged with not disturbing, and even maintaining, the balance inherent in nature. Nature,

as signs of God, becomes meaningful only when observed by the human. In the words of Izzi Dien (1997, 48), “the creation of this earth and all its natural resources . . . serves to develop human awareness and understanding of this creator.” Even *tawhid*, while theologically focused on divine unity, is typically mobilized in this context to emphasize human relationality with the rest of creation. So, despite the theoretically strong theocentric elements emphasizing that all creatures belong to God and are for God, Islamic environmental discourse is anthropocentric in practice. The problem with this scheme is not that Islamic environmental discourse places the human being at the center of its conceptual structure but that it says surprisingly little about what it means to be human. In other words, it emphasizes the human to such an extent that it ought to offer a more developed theological anthropology, yet it does not. We encounter what might be called an “anthropology without anthropology”: the discourse revolves around the human yet lacks a coherent vision of the human beyond their moral function.

An example of this orientation can be found in the discussions of creation as signs of God. As Khalid highlights, the term “nature” does not appear in the Qur’an in the way we use it today. Instead, the Qur’an speaks of creation (*khalq*), a term that encompasses all created beings. All of creation is described as a sign of God in the Qur’an (Khalid 2002, 334). From this perspective, the exploration of nature is not separate from the exploration of the human being; both are integral to a theological engagement with the signs of God. This means the human being, as part of creation and as a sign in their own right, is not merely an observer but also a place of divine disclosure. However, it is important to note that, within Islamic ecotheological debates, the concept of *ayat* is almost exclusively applied to nature. The idea that the human being, as part of creation, is also a sign of God is generally overlooked in the discussions. As one of the exceptions, Özdemir (2003, 11) notes that “every individual creature or being has its own ontological existence as a sign of God . . . Therefore, every creature deserves attention and consideration for its relation to the Divine.” Even here, however, the focus remains on the actions of “attention and consideration,” which are unique to the human being, rather than on the human being as a sign of God. There are exceptions that emphasize the human being as part of nature, thus “participating as an integral element in the overall ecological balance” (Haq 2001b, 157). However, this perspective is not widely reflected in the broader Islamic ecotheological discussions, as they are rarely developed further. Yet in most Islamic ecotheological texts, the human appears primarily as a responsible observer, not as an ontologically situated, active, and limited creature embedded in creation. The human being is an observer, a contemplator, who is responsible for keeping the balance that inherently exists in all creatures. This approach results in two possible risks in terms of the human–nature relationship. First, it reduces the human role to functions such as

guardian without a relevant theological anthropology questioning of what these functions theologically or metaphysically imply, explored further in the next section. By dismissing these dimensions, Islamic ecotheology unconsciously supports the illusion of human control.

Putting the human being in the position of mere observer also risks producing a functional view of nature. Although the Islamic environmental discourse resists such a view, the apparent emphasis on nature as a sign of God may result in a view in which nature's role is limited to pointing to God. The common use of *ayat* is particularly problematic in this regard because, as already noted, it seems to function only when nature is observed by the human being. At this point, it is important to recall two Qur'anic insights about the natural world. First, the creation narratives clearly show that the Earth and its inhabitants existed before the emergence of humanity (e.g., Qur'an 41:9–12). Second, the Qur'an implies that creation possesses agency independent of human perception, affirming that all beings praise God in their own ways (e.g., Qur'an 17:44; 24:41). However, such ontological insights are generally overlooked in contemporary Islamic environmental discourse, and even when they are acknowledged, they are usually reframed in ethical terms. For instance, Izzi Dien (1990, 190) observes that “the component parts of nature are entities in continuous praise of their Creator. Humans may not be able to understand the form or nature of this praise, but the fact that the Qur'an describes it is an additional reason for environmental preservation.” Here, the Qur'anic vision of creation's independent praise is interpreted as an ethical imperative; that is, the praise of the natural world becomes another reason for environmental preservation. Such approaches risk reducing nature to an instrumental role and the human being to a passive observer. A more coherent approach must seek perspectives that recognize the integrity of the natural world in relation to the wider community of creation.

The important thing here is that Muslim ecotheologians also criticize approaches that make a distinction between the natural world and humanity. Khalid (2017, 131) criticizes that “we have become observers of the life-experience we are integral to and have formed an imaginary subject/object dichotomy between ourselves and the natural world.” However, without moving this critique toward a theological anthropology, Islamic ecotheology risks repeating the dichotomies it seeks to overcome. Therefore, the issue here is not with the shortcomings of individual Muslim ecotheologians but with the broader gaps in the field itself, which has yet to develop a theological account of the human being capable of overcoming these dichotomies.

This brings us to the second content-level characteristic: the dominance of a responsibility-based functionalist anthropology, which defines the human being primarily in terms of what they ought to do rather than what they are in relation to God and creation.

Responsibility-Based Functional Anthropology

Another characteristic feature of contemporary Islamic environmental discourse is that questions regarding the ontological or metaphysical basis of vicegerency remain largely unaddressed. This is strongly connected with another issue in Islamic ecotheology: its arguments and discussions tend to be repetitive and circular, indicating that Islamic ecotheology remains largely confined within the limits of environmental ethics. This ethical framework has served to raise awareness and shape early discourse, as I highlighted earlier. However, it is not adequately equipped to engage with the complexities of the Anthropocene, an epoch defined not only by environmental crisis but also by fundamental shifts in how humanity understands itself and its place in the order of creation.

One of the key limitations of this ethical framework is that the human being is almost exclusively defined in terms of responsibility. Returning to the previous section, the mainstream assumption is that all creation is interconnected, and the human being must act as its custodian. As Özdemir (2003, 28) highlights, “human beings, though at the top of creation, are only members of the community of nature.” Yet this assumption and others mentioned earlier raise critical questions: What does it mean to say that the human being is a part of nature? What does it mean to be a member of creation while being at the top of it? How do we understand interdependence within a theological anthropology? Explaining such questions solely through a functional lens where the human being is an observer, a guardian, or a balance-keeper is insufficient in the Anthropocene due to the reasons explained.

Current discourse tends to focus on moral prescriptions and duties toward nature without engaging deeply with the broader theological and anthropological dimensions that underline the human–nature relationship in Islamic thought. While classical exegetical traditions show considerable diversity, contemporary Muslim ecotheologians choose to interpret *khalifa* primarily in ethical–functional terms. As Chauki Lazhar (2023) clearly shows, the Qur’anic concept of *khalifa* has been interpreted along divergent lines, either as the human being’s representation of divine command or as succession within creation itself. He actually argues that “the majority of contemporary Muslim intellectuals have reduced the concept of vicegerency, as a human existential function” (Lazhar 2023, 100). This existential–functional interpretation has mostly focused on “building and populating the earth . . . and the utilisation of its resources” (Lazhar 2023, 100). In contrast, Muslim ecotheologians have reoriented this interpretation toward a clearly ethical understanding based on responsibility and moral accountability that rejects any notion of human domination over the rest of creation. While this makes Muslim ecotheologians distinctive in their approaches, the underlying framework remains functional and thus continues to lack a deeper theological foundation. The gap, then, should not be attributed

to individual Muslim ecotheologians but to the overall intellectual conditions within which Islamic ecotheology has so far developed.

As a result of the limitations caused by its current framework, Islamic ecotheological thought struggles to address key issues in a way that is relevant to the contemporary planetary crisis. These key issues include diverse questions regarding human nature, such as human uniqueness and distinctiveness, as well as various dimensions of the relationship between humanity, nature, and the divine. The widespread use of the concept of vicegerent exemplifies this. Although it occupies a central place in Islamic ecological ethics, it is often left undefined or reduced to a broad sense of responsibility without unpacking its metaphysical, theological, or even existential implications. At this point, it is important to again highlight Nasr as a notable exception regarding this issue. Although being problematic at some points, his environmental thought takes human responsibility as its center, developing his understanding of vicegerency around it on metaphysical ground (for a study examining Nasr's theological anthropology in an ecotheological context, see Öztürk 2026). However, the mainstream environmental discourse is unable to develop a theologically comprehensive and strong approach to responsibility. In short, environmental ethics within Islamic ecotheological discourse puts particular emphasis on the concept of vicegerent, which is defined in terms of the functionality and responsibility of the human being toward nature yet does not include a theologically robust understanding of it.

Apologetic Tone

The dominant ethical framework in Islamic ecological discourse is reflected not only in its conceptual content but also in the apologetic tone that often characterizes the writings of the scholars in the field. Such tendencies become particularly clear in their selection of language, where specific word choices reveal an effort to defend the ecological relevance of Islam rather than develop a constructive theological perspective. A vivid example of this can be found in S. Nomanul Haq's (2001a, 111) statements:

Among the three grand monotheistic faiths, Islam has been spared the onus of explaining any scriptural imperatives for humanity to “subdue” the earth and seek to establish “dominion” over the natural environment—an onus that has exercised and troubled many a sage in the Jewish and Christian traditions.

Similarly, Parvez Manzoor (1984, 150) states:

It is my conviction that within the context of environmental debate, the Islamic viewpoint has not only been unduly neglected but that Islamic traditions and

values provide a very effective and comprehensive answer to the absurdities of our environmental situation.

The apologetic tone in these examples is evident particularly in the choice of wordings, such as “spared the onus,” “unduly neglected,” and “provide a very effective and comprehensive answer.” This tone also characterizes the broader message of several Muslim thinkers. Their work often emphasizes that Islam presents a systematic view of nature capable of addressing environmental challenges, implying that Islamic principles alone are sufficient and that no further theological development is necessary. An example of this defensive approach can be found in Izzi Dien’s article “Islam and Environment: Theory and Practice.” He writes: “This paper maintains that Islam may offer valid grounds to resolve not only the environmental problem but also the water distribution problem which is strongly associated with” (Izzi Dien 1997, 55). The solution, according to Izzi Dien (1997, 56), is to return to the original sources of Islam: “The proposed solution is to go back to the traditional Islamic relationship between humans and the earth, and between humans and the other elements of the ecosystem and perhaps most essentially between humans themselves.” The external defensive approach is complemented by an internal critique. A significant part of the rhetoric of Islamic environmental discourse is the self-critical tendency of Muslim environmentalists, although it is not as dominant as the defensive stance. The primary argument is that Islam possesses all the solutions for the contemporary ecological circumstances, yet Muslims fail at practicing authentic Islamic teachings and principles. This ends in a conflict between what Islam is and how Muslims live. Regarding the conflict between the genuine Islamic ecological teachings and the practices of Muslims, Ziauddin Sardar (1985, 220) writes: “What concerns a growing number of Western scholars is the clear dichotomy between our behaviour and life-styles, including the behaviour and life-styles of most Muslim societies, and what ecology teaches us.” Khalid (2017, 131) highlights a gap between Islamic textual traditions and contemporary Muslim practice, stating that “[t]he textual tradition in Islam is deep and profound, but current Muslim practice is shallow.” These statements are important to define the main characteristics and context of early and modern Islamic ecotheological discourse.

The early development of both Christian and Islamic ecotheological discourse can be better understood against the backdrop of White’s seminal essay “The Historical Roots of Our Ecological Crisis.” White’s claim that contemporary ecological problems stem from theological traditions was the main factor that prompted the emergence of ecotheological perspectives. In Christian ecotheology, the earliest responses presented a distinctly apologetic tone, seeking to defend theology by arguing that the problem lay not in Christianity itself but in distorted interpretations of it (for more information about the

emergence of Christian ecological discourse, see Conradie 2006, 9–92). Within this context, the apologetic stance of Muslim ecotheologians becomes clearer: while Christian thinkers sought to show that Christianity entails not ecological destruction but rather its opposite, Muslim voices emphasized that Islam had been excluded from these debates and that its perspectives on nature deserved recognition. This dynamic helps explain the apologetic tone that marks much of the early Islamic discourse. Such discussions can be situated within the broader context of Abrahamic responses to claims that the roots of the ecological crisis are fundamentally theological. They reflect a broader pattern in early Islamic ecotheological discourse to defend Islam's ecological legacy, often by distancing it from perceived theological flaws in other Abrahamic traditions.

The rhetorical pattern of Islamic ecotheology, combining apologetics with self-critique, played a formative role in early Islamic environmental discourse. It helped establish the relevance of Islamic thought within global environmental discussions and construct a valuable ethical vocabulary. This shows that an apologetic stance can serve a valuable function: it affirms identity and grounds discourse in tradition. However, while such a tone was perhaps necessary in the formative stages of the field, especially in asserting the relevance of Islamic teachings in global environmental discourse, it also risks restricting Islamic ecotheology to a self-referential and defensive mode. This can make the field appear limited, repetitive, or more concerned with justification than innovation. If it becomes the dominant mode of engagement, it may prevent open dialogue and critical appropriation of insights from other traditions or disciplines. Such an approach now shows its limitations in the context of the Anthropocene. Islamic ecotheology in its current form seems more like “nineteenth century ecological science and related rise of environmentalism,” as in the words of Northcott (2018, 22). In a time of fundamental ontological and epistemological shifts, the ecological crisis demands more than defense or self-critique; it calls for critical theological and anthropological reimagination. In the Anthropocene, which demands theological rethinking across boundaries, such a closed position is no longer sufficient. What is needed is an approach that is confident in its foundations but also open to reimaging, as well as contributing to shared planetary concerns through comparative, dialogical, and theologically constructive engagements.

While this article focuses on the most systematic voices in Islamic ecotheology, their role in defining the field's parameters makes the dominance of ethical frameworks particularly visible. This framework persists in the most recent contributions. While it is not possible to review all the recent work in the field, it is fair to mention a few examples. The dominant ethical framework can be seen in works such as Mohammad Fazlhashemi's (2025, 25–40) chapter “Islamic Ecotheology” published by a well-known academic, which remains largely situated within the established paradigm of Islamic environmental ethics. While

the chapter engages Islamic environmental concepts and arguments through Nasr's thought, it does not move beyond the existing framework or significantly advance the discourse. A similar pattern is evident in Mohammad Yaseen Gada's (2024) volume *Islam and Environmental Ethics* published by another prestigious academic press. Although the book offers one of the most systematic and comprehensive overviews of the field to date, its contribution lies primarily in synthesizing existing approaches. It is important to note that these works do not explicitly claim to offer theological responses to the Anthropocene. Yet their framing continues to reinforce the impression that Islamic environmental discourse is largely confined within an ethical structure that limits its ability to deepen or broaden its scope of inquiry and engagement. Recent contributions, such as Zuleyha Keskin and Mehmet Ozalp's (2020, 119–34) "An Islamic Approach to Environmental Protection and Ecologically Sustainable Peace in the Age of the Anthropocene," acknowledge the Anthropocene context but largely focus on the ethical paradigm by grounding ecological responsibility in Qur'anic justice and balance. Their framing leaves the human being as a taken-for-granted category rather than one in need of reimagination in light of the Anthropocene. They center human responsibility without examining the theological anthropology that would make such responsibility coherent or meaningful. While valuable, such approaches illustrate the persistence of ethical framings and the lack of deeper theological–anthropological engagement. Perhaps even more concerning is the structural limitation of the field: not only does Islamic ecotheology remain underdeveloped as a discipline, it also suffers from a shortage of scholars who identify primarily as Muslim ecotheologians rather than environmentalists drawing on Islamic sources.

In this context, it is worth highlighting two recent works that have the potential to carry Islamic environmental discourse forward. The first is Ingrid Mattson's "Rethinking Islam and Animism: Connecting with the Community of Created Beings." In her work, Mattson (2024) shifts the discussion from ethics to ontology and relationality by highlighting the need to understand the human being not only as an ethical agent but also as ontologically embedded creature. The second is Marita Furehaug's (2022) "Apocalypticism in Islamic Environmental Thought: The Anthropocene as a Theological Concept," which introduces apocalyptic discourse into Islamic environmental thought. This move is particularly important because apocalyptic discourse can deepen and enrich Islamic ecotheology by expanding its scope beyond an ethical–functional anthropology to include questions of ontology and eschatology. However, such attempts remain very few in number, highlighting the need for more systematic efforts to move Islamic ecotheology beyond its ethical framework.

As argued earlier, the Anthropocene requires a rethinking of not only the natural world but the human being. Islamic environmental discourse has made important progress in articulating a view of nature that is scripturally grounded

and coherent. However, what is now needed is a more theologically rich and anthropologically adjusted discourse that engages more deeply with the complex conditions of our time.

Conclusion: Toward a New Paradigm in Islamic Ecotheology

This article has shown that Islamic ecotheology, while making important contributions, remains confined within an ethical paradigm due to three interrelated tendencies. First, the human being is placed at the center, most often framed through the concept of vicegerency, yet without a developed theological anthropology that explains what humanity is beyond its functions. Second, the field relies on an ethical–functional approach, equating the human role almost exclusively with responsibility. The categories it is based on lack theological depth and prove inadequate in the Anthropocene, where humanity acts not only as a moral agent but also as a geological force transforming the planet. Third, the discourse often maintains the apologetical language of its formative period, repeating familiar motifs without engaging more deeply with contemporary intellectual debates such as posthumanism, new materialism, evolutionary theory, and even Christian ecotheology. These three tendencies, taken together, explain why Islamic ecotheology remains largely limited to environmental ethics and highlight the need for a richer theological anthropology capable of addressing the complexity of the human condition in the Anthropocene.

I suggest that Islamic ecotheology urgently needs a shift of focus. In light of the tendencies outlined, this shift should take place along two main dimensions. First, a shift in content: the construction of a theological anthropology that moves beyond functional categories of responsibility and develops a stronger account of the human being in relation to God and creation. This includes rethinking the concept of vicegerency, or, in a broader sense, a stewardship model in light of Anthropocene science, moving beyond the fixed accounts of the human and assumptions of human control. Second, a shift in rhetoric: the adoption of a comparative method as an integral part of Islamic ecotheology. Such a method enables Islamic ecotheology to engage more deeply with contemporary theological and philosophical debates while moving beyond the apologetical language of its formative period. This includes entering into conversations with the most recent philosophical and theological debates on issues such as human uniqueness and distinctiveness, anthropocentrism, interconnectedness, agency, and relationality. Particularly important at this point is an engagement with Christian ecotheological themes. Christian ecotheology has developed a sustained body of literature on the theological dimensions of ecology through critical engagement with contemporary intellectual movements. This makes it a valuable conversation partner for Islamic ecotheology, offering both parallels and contrasts that can enrich its own development. Such engagement also enhances the intellectual depth and constructive influence of Islamic ecological

discourse within broader ecotheological debates. Unless Islamic ecotheology develops a coherent theological anthropology and engages with recent debates on the human role within creation, it cannot speak meaningfully to the moral, metaphysical, and intellectual challenges of the Anthropocene. This shift will allow Islamic ecotheology to participate more effectively in broader ecotheological and posthuman debates and contribute meaningfully to global conversations about the role of humanity on Earth.

The relationship between ecology and anthropology in the Anthropocene is intrinsically mutual. Today's ecological conditions require the redefinition of anthropology, while anthropological reflection can no longer continue without reference to ecological crisis. In other words, today's environmental conditions do not merely constitute a context for theological anthropology but are an integral part of it. As Jan-Olav Henriksen (2023b, 5) rightly argues, theological anthropology must address "the challenges to human agency posed by the Anthropocene in ways that observe the different contexts." Since the Anthropocene is defined by the human impact on Earth's systems, today's ecological realities are inseparable from the questions of human nature and agency.

This critique should not be read as a rejection of environmental ethics or the contributions Islamic ecotheology has already made. The concern lies in the dominance of an ethical framework that has constrained the development of a deeper theological anthropology. Ethics remains necessary, but it is not sufficient for addressing the ontological and theological questions posed by the Anthropocene. Rather, this critique is a call to expand the discourse to place ethics within a broader theological vision that includes a robust, relational understanding of the human being within creation. Today's ecological crisis, I suggest, calls for a new theology of the human being, and such a theology will transform how we do ecotheology.

Competing Interests

The author declares that they have no competing interests.

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The Drowned Buddha: Buddhism, Ecology, and Mythopoeic Science in Kim Stanley Robinson's *Science in the Capital Trilogy*

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This article examines how Buddhism is mobilized in Kim Stanley Robinson's *Science in the Capital* trilogy as both a critique of scientific hyperrationality and a resource for ecological ethics. Drawing on the Dalai Lama's "secular ethics" and the seventeenth Karmapa's "path of environmental Buddhism," Robinson invokes Buddhist concepts of emptiness (*śūnyatā*), interdependence (*pratītyasamutpāda*), and compassion (*karuṇā*) to resist what Lisa Sideris terms "mythopoeic science," the sacralization of scientific narratives as redemptive cosmologies. However, his engagement with Buddhism remains selective: traditions are taken up insofar as they reinforce his vision of a reconfigured science, while those less compatible with Western rationalism are set aside. The result is a portrayal of Buddhism that simultaneously critiques scientism and reinscribes American exceptionalism, whiteness, and technocratic authority. Situating Robinson within the broader history of Buddhist modernism and its American reception, the article argues that his trilogy illuminates both the possibilities and limitations of Buddhism's role in shaping ecological thought in the United States.



In recent decades, scholars of religion and Buddhist practitioners have argued that Buddhist ethics have the potential to avert the climate crisis, an idea rooted in the notions of emptiness (*śūnyatā*), interdependence (*pratītyasamutpāda*), and compassion (*karuṇā*). This discourse has found fertile ground in the United States, where Buddhism—particularly in places such as San Francisco, long a hub of Asian immigration, countercultural spirituality, and transnational Buddhist exchange—has been reinterpreted within American cultural and political frameworks. Inspired by these concepts and the Dalai Lama’s “secular ethics,” Kim Stanley Robinson’s *Science in the Capital* trilogy tries to challenge the epistemological authority of what Lisa Sideris (2017, 5) calls “mythopoeic science”—“the recasting of scientific information as a consecrated narrative or poetic vision.” However, I suggest that Robinson’s vision is not just a neutral transplantation of Buddhist ideas but reflects the selective appropriation of Buddhist concepts that resonate with American concerns about science, politics, and ecological collapse while discarding those aspects less amenable to Western epistemologies. In this sense, the trilogy exemplifies both the promise and the perils of American Buddhist modernism, which has historically oscillated between genuine engagement with Asian religious traditions and the instrumentalization of Buddhism to serve American projects of self-improvement, progress, and global stewardship.

Robinson’s work is particularly fruitful for examining whether Buddhist environmental ethics can function within a neoliberal, materialist epistemology, precisely because he is both a science zealot and a Zen practitioner. What interests me here is not only his literary imagination but also the religious stakes of his project: Does his invocation of Buddhism open up an epistemological “outside” to American scientism and exceptionalism, or does it mimic the extractive ethos of American self-care discourses that have long drawn upon Asian cosmologies while marginalizing their ritual, communal, and soteriological dimensions? His novels repeatedly return to questions that have defined the American encounter with Buddhism since its popularization in places like San Francisco’s Zen centers: Are Buddhist teachings a liberating resource for ecological transformation, or have they been appropriated into the same hierarchies of whiteness, rationality, and masculinity that govern the United States’s cultural authority? Robinson’s engagement with Buddhist notions of interdependence, compassion, and right action is complex and nuanced, shaped by his Marxist commitments and anti-capitalist sensibilities, but is ultimately constrained by his loyalty to anthropocentrism and Eurocentrism.

The three novels I examine—*Forty Signs of Rain*, *Fifty Degrees Below*, and *Sixty Days and Counting*—depict a near future ravaged by climate catastrophe, where extreme weather begins to threaten the survival of human and nonhuman populations alike. At the center is Frank Vanderwaal, a sociobiologist, and his colleagues at the National Science Foundation (NSF), “a skeptical gang

of hardened old technocrats” (Robinson 2004, 263) who seek to break the alliance between science and capitalism and reposition scientific practice within a moral frame of reference. Frank enters the trilogy as one of Robinson’s purest avatars of scientism: a hyperrational NSF scientist who trusts models, data, and institutional expertise with near-religious devotion, convinced that only science, rigorously applied, can save the world. But soon he comes to see that reason alone is impotent without compassion, and that to salvage science from scientism, equations must be animated by the ethics of care. In embracing this fusion between reason and emotion, Frank drifts into the quietly messianic role the novels ultimately assign him—a technocratic savior newly infused with moral purpose who redeems the world through science.

This transformation is catalyzed by encounters with politically engaged Buddhist monks from Khembalung, a fictional island nation in the Bay of Bengal which, due to climate change, is on the verge of sinking. The Khembalis come to Washington to lobby the United States government and its scientific institutions to act on climate change in order to save Khembalung from submersion. Their embassy is inside the NSF building, a choice that is not accidental: they place themselves as close as possible to the machinery of scientific authority because they understand that this is where planetary decisions are being made in Robinson’s world. The Khembalis eventually succeed in their goal—their “exotic wisdom” prompts American scientists to rethink their stubborn loyalty to mathematical reason, with Frank coming to realize that “the excess of reason is itself a form of madness” (Robinson 2004, 268). Scientists now take up the path of “compassionate action,” characteristic of Mahāyāna or Theravāda Buddhism, to implement global geoengineering solutions that would curb the effects of climate change. And the Khembalis, who turn out to be long-displaced Tibetans, return to Tibet and their lost land of Shambhala thanks to the United States president, who makes a diplomatic arrangement with China. Having completed their role in catalyzing climate action, they are now able to go back to an esoteric form of Buddhism that no longer requires political engagement, which, conveniently, works perfectly well for the American government. Finally, the arc of the narrative culminates not in a redistribution of global religious or ecological agency but in the consolidation of United States exceptionalism, where Buddhism serves as a moral supplement to American scientocracy rather than an alternative to it. In this way, Robinson’s fiction dramatizes both the attraction and the limits of Buddhist modernism as it is taken up within American frameworks of power and global stewardship.

To contextualize Buddhism’s growing prominence in global environmental discussions, I will first draw on some histories of Buddhist modernity and postmodernity and show how its hybridity as a religion, science, and political agent represents a possibility for ecological transformation, while also drawing attention to the potential pitfalls of reducing Buddhism to science. In the second

section, I place science studies in conversation with the Buddhist notions of emptiness, interdependence, and compassion to show how Robinson tries to undo science's claims to impartiality, bring attention to ontological relationality, and afford science an ethical positionality. In the third section, I show how Robinson undermines the revolutionary potentials of his repoliticized science as his "right action," another crucial tenet of Buddhist eco-philosophy, rests upon the neglect of the underprivileged communities as well as nonhuman members of the planetary matrix. Robinson ultimately demonstrates that his ethics are highly selective and that he is unable to will away the myth of white American exceptionalism and scientific supremacy.

Buddhism as a Panacea?

In an interview for *Lion's Roar*, Robinson notes that *Science in the Capital* was partly inspired by the Dalai Lama's talk in Washington, DC: "There I was at the Washington Wizards basketball arena with 13,000 people, and the Dalai Lama was speaking. I put this event straight into the novel exactly as it happened. I couldn't help it—it was so incredible" (Miller 2015). The figure of Rudra, one of the eldest Buddhist monks, is, in fact, the Dalai Lama "living under a pseudonym in the NSF building" (Robinson in Miller 2015), while frequent references to ontological interdependence and calls for the reduction of suffering and right action suggest that Buddhist modernism helps Robinson in his attempt to undo the myth of scientific purity and envision a science that is more conducive to reckoning with the climate disaster.

It is not uncommon for the people of North America and Western Europe to turn to Buddhism in hope of alleviating some of their modern ailments.¹ But what is it that makes Buddhism so captivating? And what kind of Buddhism exactly is at play? In *The Making of Buddhist Modernism*, David McMahan (2009, 5) traces the construction of a modern, globalized version of Buddhism that, in the North American context, has been seen as an ideal alternative to the predicaments of "epistemic uncertainty, religious pluralism, the threat of nihilism, conflicts between science and religion, war, and environmental destruction." While the Western subject has often turned to "exotic" cultures in hope of regaining a sense of wonder at the mundane, Buddhism has been particularly convenient for bridging the gap between enchantment and disenchantment due to its alleged resonance with science. On the one hand, Buddhism is portrayed as a "rational religion" not at odds with the scientific understanding of the world, while on the other, "its emphasis on compassion, selflessness, and careful scrutiny of the mind might mitigate the destructive ends to which science has been put" (McMahan 2009, 74). With its rehumanized scientific rationalism, modern Buddhism has been defined through the negotiation of the tension between transcendence and immanence, at the same time mimicking and critiquing the notions that constitute Western modernity.

While traditionalists might think of modern Buddhism as a Western construct disparate from its “authentic” form, McMahan cautions that contemporary Buddhism is, in fact, a constellation of the European Enlightenment and Asian traditions and an inevitable product of colonial expansion foundational to the invention of the ethno-national subject across many parts of Asia. The making of globalized Buddhism was from its onset contingent upon jettisoning its localized, nationalized, and indigenized forms in favor of universalistic, egalitarian, and philosophical elements that European intellectuals who studied ancient Buddhist texts attributed to “pure” Buddhism (Masuzawa 2005, 131). Such a description of a demythologized Buddhism afforded it a special place in the 1893 Parliament of the World’s Religions in Chicago, putting it on par with, if not surpassing, Christianity. With its rationalist outlook and empathetic concerns, Buddhism has become “the Light of Asia” (Masuzawa 2005, 46), ready to join the global playground of competing ideologies. Recent critics of Buddhist modernism such as David Forbes (2019) and Evan Thompson (2020) write that the insistence on Buddhism as a “rational religion” often faces the danger of it being fully reduced to science and can serve to rehabilitate individualism and reinstitute neoliberal politics of domination.

In her book *American Dharma: Buddhism Beyond Modernity*, Ann Gleig (2019, 140) brings another facet of Buddhism in North America to the fore: namely, “the lack of diversity and presence of racism and white hegemony within American convert sanghas.” She shows that American Buddhism has been shaped by structural whiteness, even as it often presents itself as universal, progressive, and post-racial. Her ethnographic work has demonstrated that convert Buddhist communities have historically marginalized Asian American Buddhists, denying them the role of authoritative religious actors. By doing so, they have universalized white, middle-class experiences as normative forms of “modern” Buddhism. Gleig argues that this racial dynamic is closely tied to Buddhist modernism’s emphasis on rationality, individual experience, and secular/scientific compatibility, which implicitly (and, sometimes, explicitly) privileges white liberal subjectivities and obscures the racialized conditions under which Buddhism has been transmitted, practiced, and authorized in the United States.

But not everything is so bleak for Buddhism beyond Asia. Gleig (2019) has also found that the idea of “modern” Buddhism as drifting away from tradition is increasingly contested among North American Buddhist communities and argues that Buddhism in the United States might be better described by “postmodern” than “modern.” From the emphasis on rationalized and demythologized Buddhism, she traces a shift towards historicity and contingency, a “cultural sensibility that celebrates diversity and difference, and a critical, ironic, and self-referential form of consciousness” (Gleig 2019, 9). People of color, especially African American convert communities, have started to gain visibility, unsettling the dominant connection of American Buddhism

with whiteness, corporate classism, individualism, and scientism. Thus, the very features that once made Buddhism so attractive to Eurocentric modernity are now facing growing internal critique, bringing the questions of ritual, ethics, class, race, environment, and community to the fore.

Crucial to this discussion, postmodern Buddhism's sphere of action goes beyond merely assisting capitalist enterprises and neoliberal forms of "personal development." Vietnamese monk Thich Nhat Hanh coined the term "engaged Buddhism" to refer to monks' activism aimed at ensuring peace during the Vietnam War. The term and its praxis have been maintained and expanded to encompass the combat against "militarism, racism, inequality, poverty, and environmental degradation . . . challenging not only the personal but also the systemic causes of these phenomena" (McMahan 2009, 253). While critics such as Charles Prebish (1999) have decried engaged Buddhism as being severed from "tradition," Gleig reminds the reader that Buddhism is not a singular category, as some Buddhist traditions, such as Mahāyāna and Theravāda Buddhism, specifically emphasize compassionate action.

Following the tenets of engaged Buddhism, the last decades of the twentieth century witnessed the emergence of an idea that Buddhism can serve as a constructive response to the ecological crisis, a movement grounded in the doctrine of interdependence (*pratītyasamutpāda*), emptiness (*śūnyatā*), and compassion (*karuṇā*) that Ian Harris (1971) refers to as "eco-Buddhism." Eco-Buddhism is an amalgam of Western environmental discourses, such as deep ecology (Arne Naess), Gaia (James Lovelock and Lyn Margulis), and systems theory (Ludwig von Bertalanffy), and Buddhism. While Harris questions the compatibility of the Buddhist tradition and deep ecology, Rita Gross (1997, 334) moves beyond Harris's skepticism and contends that "[t]he question is not what has Buddhism said about ecology and the environment, but what could Buddhism have to say about these subjects."

So how exactly can Buddhism help in the anti-climate change struggle? In "Walking the Path of Environmental Buddhism through Compassion and Emptiness" (Ogyen Trinley Dorje 2011), the seventeenth Karmapa delineates how the aforementioned tenets can assist in recontextualizing the human role in the climate change struggle. *Śūnyatā* helps us understand that nothing has an essence in and of itself and that everything has meaning only in relation to everything else. Ignorance of *śūnyatā*, the Karmapa writes, leads to a false belief that the Self is separate from the Other, which results in the othering of Earth. Thus, only by becoming aware of the illusory nature of the Self can one deconstruct the binary between nature and culture that is the underlying condition of ecological devastation. Finally, once one ceases seeing nature from a utilitarian lens, as an object to be extracted, and sees it instead as an entity rhizomatically interwoven with culture, one can start cultivating compassion for all animate and inanimate beings.

The emphasis on interconnectedness and the agency of more-than-human worlds has been on the rise in scholarly disciplines such as posthumanism, postcolonialism, and science and technology studies. But rather than arising in a theoretical vacuum, this shift largely owes to Indigenous communities and their religious (or, for some, “spiritual”)² practices where plants and animals, but also rivers and mountains, have been recognized as invaluable subjects that sustain both the communities’ lives and the lives of larger ecosystems. For instance, the contributors to *Cosmopolitical Ecologies Across Asia* (2022) trace what the editors call “cosmopolitical ecologies”—practical and theoretical approaches to ecology grounded in multiplicity, historical and geographical situatedness, reflexivity, participatory knowledge, and the agency of nonhuman Others, as contrasted with top-down, Eurocentric, scientific models that seek to “manage” rather than co-create with nature.

Several of the book’s chapters note how Buddhism in particular motivates environmental activism in Asia. Astrid Hovden and Hanna Havnevik document how Tibetan Buddhist monastic authorities in the Himalayas assert environmental sustenance as a moral and karmic obligation to these sacred landscapes—a belief system that helps regulate grazing, forest use, and water access. Caroline Humphrey’s chapter likewise shows how Buddhist-inflected memorial practices and ritual engagements with soil, mountains, and ancestral sights are tightly bound to environmental responsibility. It is important to note that practicing such rituals does not mean denying scientific practice: “[T]he rites [she has] described here are not seen as antithetical to scientific and practical action but rather as their essential accompaniments” (Humphrey 2022, 119). What’s more, Tibetan studies scholar Yudru Tsomu demonstrates how in Tibet, Buddhist communities and secular formations such as scientific organizations often collaborate to ensure effective environmental action for their surroundings. Humphrey writes that at times their views dovetail, and at times they clash, while the specific enactment of environmental practices depends on political leaders, religious and political regulations, scientific funding, etc. A thread that cuts through all these examples is the communities’ long-term connection to land, which rests on personifying natural entities and on karmic doctrines that motivate care and responsibility to their landscapes.

It is important to note that, historically, Buddhism as praxis rather than a belief system was far from a tradition sensitive to environmental concerns. In his trenchant account of Asia’s environmental history, Johan Elverskog compares Buddhist expansion to the European “commodity frontier” and its extraction of land and natural goods. He contends that “in place of the popular view of Buddhism as centered on renunciation and antimaterialism, we need to substitute the recognition that Buddhism was in fact centered on wealth” (Elverskog 2020, 3). However, despite its checkered past, Buddhist practitioners have managed to not only change their relationship with the nonhuman but also

recode the Dharma from within. The fourteenth Dali Lama (2023) has famously said that “[i]f science proved some belief of Buddhism wrong, then Buddhism will have to change,” although traditional beliefs such as *karma* or *nirvāṇa*, which are unverifiable by science, are still considered fundamental elements of the contemporary Buddhist practice in Asia. As such, Buddhism serves as an exemplar against the attachment to religious dogmas—whose fixity has proven untenable in the liquidity of an ever more globalizing and modernizing world—while still maintaining its legitimacy as a transnational, global religion rooted in the centuries-old Asian tradition.

As I have shown, Buddhism is not a singular category but a multiple, historically and geographically contingent set of practices—at times neglecting the elements associated with “traditional” Buddhism, such as karma and rebirth, while at others, rendering such elements essential. What has been documented as an effective strategy for Buddhism engaged in environmental action is not so much the abstract notions of emptiness, interdependence, and compassion but more so their concrete, lived enactments. Interdependence frames the nonhuman world as an active participant in ecological processes, while compassion toward it becomes a necessary condition for maintaining ecological balance. In the following sections, I examine whether Robinson’s vision reflects the forms of environmental activism already enacted within Buddhist traditions or ultimately assimilates these tenets into a progressivist ethos of American exceptionalism and scientocracy.

Unsettling the Purity of Science

In this section, I examine how Robinson employs the Buddhist notions of emptiness (*śūnyatā*), interdependence (*pratityasamutpāda*), and compassion (*karuṇā*) to dispel the myth of science’s neutrality. First, emptiness posits that everything is devoid of essence and obtains meaning only when placed in relation to everything else. Robinson uses it as a conceptual framework to show that science is always already contingent upon and deeply implicated in social, economic, and political materialities. Second, from a more ecological perspective, awareness of the interdependence of all things can help instill humility before the complexity and interrelation of all natural and social systems, a complexity that science alone can never fully explain or control. Finally, Robinson imbues science with an ethical positionality, shredding the phantasmagoric desire for a value-neutral, hermetic, and lab-like dimension of science.

Before I move to the close reading of the novel, I will first reflect on how I situate the notoriously ambiguous term “science.” Like language and images, the semiotics of science consist of a constellation of symbols that serve to illustrate the ontological processes one can observe. Scientific models such as formulas, equations, or graphs are not tangible things in and of themselves but are always-already representations removed from materiality. However, some scientists, such

as E. O. Wilson, confuse “the map for the territory; only the map seems to him fully real,” says Sideris (2017, 80). Mediations between ontological reality and their abstract rendition are effects of social and historical contexts that produce such symbolic representations, while the hegemony over what representations are deemed more “universal” than others is necessarily a product of uneven power relations. Here, I am interested in deterministic, universalizing, and absolutist approaches to science that deny the modes of knowledge production that do not adhere to the predetermined parameters of hegemonic science. While the problem of universality and abstraction has permeated science studies for a long time, with Karl Popper and Thomas Kuhn some of its pioneers, I find Sideris’s work particularly conducive to critiquing Robinson’s attempt to divorce science from any religious implications. As Sideris argues, scientific practice often parallels teleology and displays a kind of logic that parallels the rigidity of religious dogmas. Deleuze and Guattari (1994), for instance, call such modes of knowledge production “Royal Science,” marked by a hierarchical structure in which the academic institution sets the normative standards for and is invested in preserving the stability of the status quo of what counts as legitimate knowledge. It approaches experimentation from an axiomatic filter of what is already established as “universal,” a kind of solipsistic self-referentiality that significantly limits the kinds of results that can be obtained. Moreover, it tends to create the conditions for its own necessity and, mimicking the Christian paradigm, represents itself as an inevitable instrument for redemption.

Thus, instead of a critique of the ambiguous term “science,” my analysis can likely be classified under what is commonly known as “scientism”—an axiomatic view that science, due to its purported objectivity, should be the cornerstone of all normative and epistemological values. In *Scientism: The New Orthodoxy*, Richard Williams (2015, 3) writes that “scientism entails a metaphysical commitment to naturalist, reductive, or emergent materialism and tries to define science in a way that includes not only a commitment to empirical methods, but also to this particular metaphysics.” There are four assumptions that underpin the infrastructure of this ideology, he finds. First, only the knowledge acquired by the scientific method can occupy the category of “real knowledge,” however flimsy this phrase might seem. Second, all phenomena are reducible to the laws of physics, marginalizing the relevance of humanities, arts, and religion but also negating the role of subjectivity in constructing reality. Third, science has the power to solve all social and environmental problems, or, the “global problematique”—“poverty-hungerhabitat-energy-trade-population-atmosphere-waste-resource problem” (Barney 1993). And last, its inflexibility in accepting other forms of knowledge makes it a kind of metaphysics virtually isomorphic with religious fundamentalism, as Sideris cautions. She maintains that mythopoeic science is a “grand anthropocentric tale” rooted in the yet-unproven and perhaps unprovable hypothesis of the

Big Bang (Sideris 2017, 37). It contends that humans are hardwired to think in terms of origin narratives and that the widespread adherence to the scientific myth—the only viable cosmology—is the optimal solution to the looming eco-disaster. “Celebrity scientists” (Principe 2015), such as Richard Dawkins and E. O. Wilson are compared to preachers who demonstrate a strong emotional investment in defending the superior hierarchical position of science amidst the pool of other, non-physicalist epistemological stances. They are certain that the scientific method will eventually help humanity reach a “nirvana of knowledge” (Sideris 2017, 34), obviating any possibility of ambiguity and doubt.

Moving away from metaphysics closer to the material conditions of the scientific practice, it is important to note that “science” is not a monolithic category. There is an ever-growing multiplicity of scientific disciplines; some are more exacting, such as mathematics and theoretical physics, and some are less so, such as genetics and evolutionary biology. However, in terms of contextual applicability, there is rarely only one scientific discipline at play, especially when it comes to responding to ecological disasters. For example, in the case of wildfires, it is not only the department of forestry that will have to react but also those of ecology, climate modeling, remote sensing, emergency management, public health, various kinds of engineering, etc. Science, then, is a convergence, a rhizomic *event* as Deleuze and Guattari would have it, that stands at the intersection of not only a variety of sciences but also interdependent subjectivities, socioeconomic milieus, geographies, and temporalities, all of which fold into one another to produce the response required by a particular situation.

Bruno Latour (1997), for example, saw the scientific practice not as an objective, abstract, and clearly demarcated mode of knowledge production but rather in terms of Actor-Network-Theory, which assumes an operative symmetry between the materiality of human and nonhuman actors, or “actants,” in constructing scientific knowledge. While his emphasis on the animate and inanimate nonhuman agents has been an urgent intervention in science studies, some authors object to the perils of his “flat ontology,” i.e., the equal and horizontal distribution of agency, as such a view tends to obscure the dynamics of power relations and lends limited attention to cultural and historical contexts.³ Fredric Neyrat (2021, 118) insists that “[h]is problem is knowing “how to bring the sciences into democracy—this is the subtitle of *Politics of Nature*—rather than how to get democracy into the sciences!” In this regard, I suggest that what breathes air into the congregations that constitute scientific practice is more often than not shaped by scientism as an ideology, a knot that carries a heavier weight and often directs the shape of the event, or the way science realizes itself in a particular moment in space and time.

The stakes of such a rigid epistemological stance are manifold. The pernicious insistence on the supremacy of human reason, which is very often reserved for Man—white, Western, male, bourgeoisie subject—over all other forms of

knowledge has resulted in Anthropocentrism that attempts to exert an ever-greater control over the mischievous, “disobedient” planet. It disavows ethics and, making the weight of such ideology ever heavier, it continues to suppress the self-determination of the nonhuman world on which the very existence of humanity depends. However, the continued investment of some humans (read: Man) in othering “nature” is already showing that the weight of its force will make it collapse in on itself. As an antidote to the scientific hubris that assumes humans can know and master “nature,” Sideris suggests a humble openness to doubt, an acceptance that the knowledge of the totality of our cosmic existence can never be obtained by reason alone, if at all.

Evidently well aware of the critiques of scientism and the futility of trying to control the vastness of nonhuman environments, Robinson is set on envisioning a new kind of science that will respond to ontological transformations from a more down-to-earth perspective. He mobilizes his creative capacities to imagine solutions to the ramifications of climate change, effects that even the most advanced scientific modeling is unable to safely predict. The trilogy recognizes the stakes of the interdependence of all things in regard to the development of climate change, as the succession of unpredictable catastrophic events in the novel marks the inevitable failure of attaining scientific certainty. The novels skillfully illuminate the ontological relationality of human and nonhuman agents, the complexity of feedback mechanisms, and the fallibility of scientific predictions: “*The interactions were so complex . . . the unforeseen consequences so potentially vast, that no one could say what would happen next to the global climate*” (Robinson 2005, 193).⁴ After the predicted rise in temperature occurs, a huge chunk of the Arctic ice melts, but its consequences are far from imaginable. The weather is marked by anomalies: “*A tornado in Halifax, Nova Scotia; the third and catastrophic year of drought in Ireland; major floods on the Los Angeles River*” (Robinson 2005, 191). The tipping points have become nonlinear, hurricanes and tornadoes erratic, floods random, and algorithmic modeling has predicted the temperature increase ranging from two to eleven degrees Celsius—hardly a prediction at all: “Again, because of the complexity of the various feedback mechanisms, and the importance of water vapor both in blocking incoming light and holding in outgoing heat, it was hard to predict what the result of any given action would be. No one had a good sense of how clouds might change in any given scenario” (Robinson 2005, 208). Having no choice, humanity in *Science in the Capital* has to recognize humility before the vastness of mutually interwoven social and natural systems and accept that it cannot encompass the planet’s totality.

Next, the Buddhist notion of emptiness (*śūnyatā*) is particularly fruitful in dislodging the insidious fictions of science’s hermetic closure and a mirage of its objectivity. While the scientific method itself may indeed be value neutral, so is everything else according to *śūnyatā*. Things obtain value only when placed in a context. Science studies have also taken up the question of “emptiness,” albeit in a different register. Karen Barad (2007), for instance, is

interested in the question of “the void,” or “vacuum,” in quantum physics, which they describe as a place not of nothingness but of “no-thingness.” The vacuum is a low-energy state with no detectable particles; however, it is a “state in which everything that can possibly exist exists in some potential form” whose possibilities are realized only in relation to an observer (Barad 2007, 92). Thus, we cannot talk of things “in and of themselves” but only relationally.

Comparatively, Robinson (2004, 124) shows that “[n]o agency operates in a vacuum” and that conducting scientific research is never an impartial practice unaffected by a nexus of personal, political, and economic interests. Zooming into the realities of peer-review processes and grant proposal decision-making, he strips naked the attempted abstraction of power that directs scientific practice. First, he underlines that the peer-review committee consists of a variety of scientists, whose choices are necessarily contingent upon subjective preferences. He is surprised that the committee has rejected the very proposal he has found most innovative and intriguing. Although he, as the committee’s overseer, has the power to subvert their decision and allow the project to be funded, he refuses to do so in order to lobby the young scientists to work for a biotech startup where he owns shares. It turns out that another member of the committee has rejected the proposal for the same reason and outpaced Frank, offering the job to the scientist in her company. Robinson’s disavowal of the scientist’s agency in choosing the conditions of his research indicates that lab work cannot be disentangled from the materialities of the neoliberal, capitalist context. He compares the lab to “just another place of production. Management tells production what to produce, and the place of production produces it. Input from the agency of production would be wrong” (Robinson 2004, 93). He decries the fact that many labs try to conceal their findings for fear of other businesses profiting from their data: “But, A secret scientific method? Was that not a contradiction in terms?” (Robinson 2004, 39). The trilogy’s protagonist Frank wonders what it would be like if science was genuinely dedicated to the betterment of humanity, if it was not so influenced by the free market, and if they could fund all the proposals they receive. How much faster would science progress? The problem with such a naive utopianism is that it still views science as uniform and potentially self-determining, denying the role of cultural and subjective preferences and needs, even if it diminishes the power of the economy on scientific decision-making. For who determines what is better or worse for “humanity”? What does he even mean by “humanity?” I will leave the responses to this problematic monolithization of the concept for the following section.

Alongside this critique of meta-science, Robinson problematizes the dogmatic attachment to reason. Anna Quibler is one of the chief NSF scientists who stands at the very end of the science/religion, rational/irrational binary—“A kind of Puritan of science, rational to an extreme” (Robinson 2004, 18). As a hyperrational individual dedicated to always quantifying reality, she refuses

to engage with ideas that cannot be proven with utmost certainty. Although she is the first character to welcome the Khembalis to their new embassy in Washington, DC, she never puts genuine effort into trying to comprehend the logic behind their Buddhist philosophy. Appalled by a website that promotes the hybridity of medicinal and religious studies—“whatever those were, she didn’t want to know” (Robinson 2004, 119)—she quickly closes it and moves on to her usual hard-science laboratory work without showing an open curiosity about how these two seemingly opposite disciplines might intersect. Anna is thus already devoted to a systemic denial of epistemologies that might threaten her symbolic survival as an eminent scientist. “Metaphors bounced off of her like spears off bulletproof glass” (Robinson 2007, 81), and just like her mind, “[h]er door was closed, the drapes (installed for her) were drawn” (Robinson 2004, 117). What Robinson is trying to critique here is not the notion of scientist *per se* but rather an obstinate attachment to a particular metaphysics without ever recognizing the porous boundaries of both one’s identity and the ideologies one is invested in defending.

Frank initially thought of Anna as a female version of himself, but after attending the Khembalis’s speech at the NSF, he begins to question both his role as a scientist as well as the sciences’ role in society. The Khembalis have shaken the ground on which Frank was standing, causing him to experience an excruciating and terrifying, but ultimately rewarding, paradigmatic shift. The monks’ assertion that “[a]n excess of reason is itself a form of madness” (Robinson 2004, 268) eventually makes him realize how much of a madman he is, desperately trying to exert control over his thoughts and emotions in order to, as Anna, maintain an image of himself as an infallible scientist. Insisting on rationality had been preventing him not only from comprehending his emotional life but also from observing that such an insistence is itself an emotional investment. He finally recognizes that algorithms and the mathematization of human logic can never explain or predict the totality of human behavior and that reason is a far cry from explaining the mystery of life and the cosmos. From an absolute faith in the scientific method, Frank finally begins to understand that science only “*wants* to understand the phenomena of the world in ways that everyone can agree on and share; it *wants* to make assertions from a position that is not any particular subject’s position,” it “*wants* to be beyond all dispute” (Robinson 2004, 89; emphasis added). But “[w]hat if the numbers don’t correspond to real life?” (Robinson 2004, 255). The purported objectivity and unerring accuracy of science is a wishful fantasy continuously refuted by the unpredictability of the ontological reactions of the natural world. Likewise, the proponents of scientism fail to understand that their disavowal of ethics is itself an ethical position.

As an alternative to hyperrationality, Robinson (2004, 275) turns to “passionate reason,” influenced by the Dalai Lama’s (quoted in Highland 2018) notion of “secular ethics”—“an approach to ethics which makes no recourse to religion

and can be equally acceptable to those with faith and those without.” Rudra, the oldest of the Khembalis, tells Frank a story about Milarepa, a murderer turned tantric yogi, that testifies to the inability of reason to always make the best choices. He says, “Milarepa say that because his guru beat him all the time, and always a good reason for it. So Milarepa never think much of reason. But that is an easy thing to notice. And hardly anyone ever reason anyway” (Robinson 2004, 476), suggesting that if reason justifies beating, it can also justify the sacrifice of human and nonhuman subjects in order to perpetuate the neoliberal capitalist system that has no ethical concern for the value of life. Frank acknowledges the need for a “*new model or paradigm, in which emotion and feeling were finally understood to be indispensable in the process of proper reasoning*” (Robinson 2004, 477). As a result, Frank and his NSF technocrats decide to mobilize their passion for saving the world and found an organization that will systematically make decisions by bringing together politicians and scientists from a variety of disciplines—Social Science Experiment in Elective Politics (SSEEP). As I show in the following section, Robinson’s vision of such a “paradigm shift” remains cemented within the same sociopolitical parameters of uneven, top-down distribution of power.

Selective Ethics, Rogue Politics

The first section of this article mentioned the insurgence of “engaged Buddhism.” Buddhist monks from Thailand, South Korea, and Cambodia, inter alia, have successfully organized to protect their environment from further extraction.⁵ They reflect the bodhisattva vow to save all beings, a tenet of Mahāyāna Buddhism that underlines the role of a continuous effort to reduce planetary suffering. While ignorance can be an obstacle to positive action, meditation, contemplation, and active acquisition of knowledge can assist in understanding how implicated one is in contributing to their own as well as others’ suffering. Having obtained the necessary knowledge, “[w]e should avoid causing harm by doing something we are not supposed to do and by not doing something we should,” the Dalai Lama (2018, 173) cautions. In this section, I examine how Robinson throws the previously discussed realizations out the window with a highly selective version of “right action” that reinstitutes the ideological configurations that initiated the eco-disaster, pointing to the structural limitations of his imaginary capacities. Robinson not only remains faithful to scientific techno-optimism, but he also reaffirms the dream of American and hu-Man exceptionality, pushing Buddhism to the margins of global environmental action.

Robinson’s *Science in the Capital*, however, is a work that sits in contradiction, while its ultimate inability to deliver science from the shackles of hegemonic logic raises further questions about the intricate relationship between the scientific mode of relating to the world, Eurocentrism, and ethics. If science has long tried to immunize itself from having to explicitly make value judgments, can it

redirect itself toward a more conscious ethical practice while also discarding its Eurocentric, colonial roots that deem “Western” civilization as one the most adequate forms of being in the world? Can it renounce its fiction of singularity and act from more dispersed, embedded positions that are closely intertwined with the needs of specific local human and nonhuman communities?

Robinson’s well-intentioned endeavor to come up with the “right action” is essentially an ethical question, a cumbersome problem that underpins much of the conversations about environmental justice. In “Ethics and the Environment: Dialogue with His Holiness the Dalai Lama,” Clare Palmer (2018), a scholar of environmental ethics, points to the conundrums behind the field and says that there is a fundamental divide between those who prioritize human wellbeing and those who are concerned primarily with the survival of the nonhuman world, although, of course, they can also coincide. The proponents of the nonhuman world argue for the moral significance of ecosystems and stress the value not only of individual species but also inanimate entities such as land and water. Even within human-centered ethics, there are significant internal disagreements, such as whether one should act towards the immediate interest of the current population or the long-term benefit of future generations. Advocates of the former base their claims on the argument that “to have rights you must exist, and since future people do not exist they are not able to claim rights” (Palmer 2018, 115). Thus, deciding how to act is always complicated by a clash of different subjective conceptualizations of what is best and for whom. The Dalai Lama responds to such dilemmas by resorting to the “rule of the majority,” and asks the unsettling question, “But when we consider society as a whole, how do we determine which group’s interests to sacrifice for the benefit of the majority?” (Palmer 2018, 127).

One problem with this question, and the pitfall Robinson fails to circumvent, is the presupposition of a singular humanity, a singular “we,” fiercely critiqued by scholars such as Sylvia Wynter, Katherine Yusoff, and Rosi Braidotti, among others. First, framing climate change as a product of human actions rather than those of Man—a white, male, Western, bourgeoisie subject—not only removes the accountability of the subject responsible for climate change but also allows Man to present himself as someone best suitable to reckon with the complexity of the climate change problem. Even if the “we” somehow extended to all humans, it still removes the importance of nonhuman lives from the equation. A more dire implication of the Dalai Lama’s question, however, is the argument that someone or something must be sacrificed for the “majority.” However, as Yusoff (2018, 51) suggests, such concerns obliterate the histories of sacrificial apocalypses that have already taken place: “the Anthropocene is configured in a future tense rather than in recognition of the extinctions already undergone by black and indigenous peoples. Following in the wake of humanism, the production of the Anthropocene is predicated on Whiteness as the color of universality.”

It must be admitted that it would indeed be naïve to think that an immense toll on human and nonhuman lives can be avoided, but having the notion of the “sacrifice” of some and “salvation” of others as the starting point for discussion reinforces the religious sentiment behind engagement with environmental issues and imposes a need to choose who can best “calculate” what kind of sacrifices must be made. It maintains a top-down logic of an “objective knower” and disregards a politics of immanence that makes decisions from the collaborative nexus of human and nonhuman agents specific to each locality. In the trilogy, Robinson resorts to techno-fixes grounded in geo-engineering projects, a form of a solution that is not problematic in and of itself but becomes so when such solutions are implemented on a global scale and their consequences to particular local ecosystems cannot be predicted. Therefore, the trilogy seems to reinforce the fantasies of ontological symmetry even when it is clear from Robinson’s writing that the weight of global geoengineering reactions spreads across the threads of local spaces exponentially and uncontrollably.

After an attempt to restore the Gulf Stream by resalinating the oceans, SSEEP moves on to terraforming the Earth and building artificial lakes that will alter the climate in the world’s driest areas. To what extent and with what consequences, they are uncertain. Such a radical terraforming proposal not only disregards the chain of potential detrimental effects on ecosystems beyond the terraformed areas but also ignores the risks for the local communities, who might be sacrificed as guinea pigs to test new technologies, rendering the sciences’ ethical positionality highly selective:

Dry and poor. I can imagine, if they were offered compensation to take the water and make new lakes, some of them might decide to roll the dice and take the environmental risk, because net effects might end up being positive . . . There’s not much going on in the Takla Makan these days, that I know of. (Robinson 2007, 137–38)

The rhetoric is reminiscent of colonial narratives of progress in which the white Man’s genius transforms the squalor of faraway wastelands and brings prosperity to its people, who seem to have no choice but to passively wait to be salvaged by Western progressive brilliance, even if such promises of salvation are highly contingent, reiterating the ostensibly superior role of Man’s agency. In the case of “unintended consequences,” SSEEP suggests some form of compensation to the devastated communities who are, anyway, “statistically insignificant populations to displace” (Robinson 2007, 170). Robinson’s (2007, 170) politics assigns the life of the Global South the role of a new currency for the “carbon market,” a residual population that is to be “sacrificed” for the perpetuation of science as the dominant mode of knowledge production that Robinson has been trying to destabilize. “But, you know,” says Frank, “since

the climate is going haywire anyway, it's kind of like, so what? In the context of everything else, will we even be able to distinguish what this would do from all the rest?" (Robinson 2007, 137). Frank's assertion conjures up another vision of a "flat ontology," a phantasmagoric symmetry between human and nonhuman agents that legitimizes continued attempts at managing both human populations deemed less-than-human (Black, Indigenous, and people of color) and nonhuman ecosystems. Neyrat (2017), for instance, is particularly critical of the tendency to mathematize life and consciously take action that might put some communities at risk:

If there is something to be criticized in the principle of precaution, it is not that it has paralyzed action, but that it has wrongly considered risks to be calculable . . . To this *precaution*, we must oppose . . . a *prevention*, that is, a preventive action which accepts *its inability to calculate risks*. This is to say that the problem does not really lie in knowing that *there will be* unwanted consequences (this is obvious), but in knowing that one can *not want* some of these unwanted consequences, at any cost. (Neyrat 2017, 112)

For Neyrat, the task of democratizing science should consist of moving away from precaution and the naïve belief that we can calculate risks towards prevention—to obviate the possibilities for risky business and the allegedly "unintended consequences."

The aforementioned example indicates that Robinson's "scientocracy" might succumb to what Jennifer Wenzel (2020, 31) calls "the imaginative inertia of [the empire's] utopias," as it primarily consists of white American men, while women, one of whom is Asian American, are similarly loyal to male notions of scientific rationality. The new president, Phil Chase, characterizes the United States as "a country that had explicitly renounced any imperial ambitions or world police responsibilities" (Robinson 2007, 135) and proclaims that "*We* have to become the stewards of the Earth" (Robinson 2007, 367; emphasis added). The "we" in question are the American scientists and politicians who "steward" the Earth with their large-scale terraforming projects, the effects of which far surpass the federal boundaries undetectable by natural environments. Ursula K. Heise argues that the trilogy "remains for the most part stuck in Washington and American government perspectives" (Heise 2008, 207) and fails to address the demands of other planetary communities. Heise, however, still advocates for a "global," cosmopolitan response that would ensue as an emergent property of all local communities. I am wary that having the "global" as a starting position can ever will away the dominance of a single population and embrace instead what Donna Haraway (1988) calls "situated knowledges"—an embodied knowledge of individuals and cultures shaped by their historical, ecological, and linguistic milieus. Failing not to incorporate but rather center

situated knowledges in the struggle against ecological degradation, Robinson reproduces the mythical status of Eurocentric normative standards as the most appropriate “steward” of the global epistemological framework.

In *Science in the Capital*, it is a mix of experts of various scientific backgrounds who, in their hermetically insulated offices, deliberate on the next course of action. SSEEP becomes a governmental agency behind the newly elected president Philip Chase that decides on future anti-climate-change action in a very “*measured and scientific manner*” (Robinson 2005, 548). It is a “*perfect storm of statistics, chaos theory, sociology, econometrics, mass psychology, ecology, cascade mathematics, poll theory, historiography, and climate modeling*” (Robinson 2005, 548). It is a “synergy of disciplines” (Robinson 2004, 248; 2005, 320) that assumes that scientists, academics, and researchers, those who make decisions from a safe distance and are rarely immersed in the materialities of ecological transformations, should create responses to the ongoing changes, writing yet another chapter of the Anthropocentric story that subsumes marginal characters into a vehicle for the seeming interruption of its storyline. Such a “synergy of disciplines” invokes what Sideris (2017, 55) refers to as “conciliatory knowledge”—“a grand unification of all knowledge that will tell us the story of our universe in an integrated fashion.” Rather than a non-dialectical, noncompetitive convergence between science and other forms of knowledge, a conciliatory narrative tends to “colonize” religious and social discourses by claiming that science offers the most accurate representation of reality. It commends the omnipotence of scientific adaptation to the changing material environments and nourishes the belief that, in the words of E. O. Wilson, science can “save the planet” (quoted in Sideris 2017, 78). Sideris (2017, 81) asks, “Why, as scholars, as environmentalists, or as human beings, should we accept this imposition of science as the final arbiter and purveyor of meaning?” She concludes that due to the detachment of science from its “object” of inspection, science alone cannot instill the moral values necessary to galvanize the public to properly care for our planet, putting forth a need for a more radical form of participatory re-enchantment.

Robinson seems to be aware of the caveat that scientists should directly experience and regenerate their wonder for the natural world, remember that they are not Other to nature, and ultimately blur the nature–culture dichotomy. After leaving NSF, Frank moves back to San Diego but eventually returns to Washington, DC to serve as one of the major representatives of SSEEP. However, as he is unable to find a suitable apartment to rent, he decides to build a tree house in one of DC’s city parks and make it a new home. Such a decision is influenced both by his engagement with Buddhism and a daily reading of Ralph Waldo Emerson’s thought. He infers, “Really the important thing was to be out in the world, to feel the wind and see the full spaciousness of being on a planet whirling through space. A feeling of beatitude; was that the right word?” (Robinson 2007, 334). He embodies the long-lost ideal of a “Paleolithic man”

and re-embeds himself in the world of the nonhuman, becoming spellbound by the renewed sense of enchantment. “Thus the joy of running in the forest, giving him little glimpses of the great unconscious Mind” (Robinson 2005, 143). Thomas Nail (2020, 5), however, classifies the aesthetic appreciation of nature as “humanist anthropocentrism,” a view still founded on the othering of nature as an object utilized for the pleasure of the human subject. After all, Frank is a white, privileged, middle-class, American man whose makeshift paleolithism is a conscious choice he can make and unmake at his own convenience. On the other hand, lower-class urban citizens rarely have the luxury of reconnecting with the spirit of the nonhuman world due to the immediate needs of having to ensure their economic survival. Many Indigenous peoples, who are increasingly fetishized for their direct and participatory knowledge of nature, have been forcefully relocated to urban places and displaced from their ways of life that do not recognize the fallacious binary between nature and culture.⁶ Moreover, when the devastating weather ravages the cages of the city zoo, Frank uses his newly developed Paleolithic perceptiveness and the knowledge he has learned about animals from scholarly readings to capture the lost animals and manage their lives in a way he and the zoo managers deem best. Even if the dilution of the lab-like, hermetic bubble where scientists often reside and their re-embeddedness in the world of earthly matter is a necessary step towards constructing a non-extractive relationship to the nonhuman world, it is certainly not sufficient. Centering the agency of the peoples who already have the knowledge specific to their habitats must be the vantage point from which to respond to ecological problems. Such an approach will obviate the pitfall of what Haraway (1988) calls “the God trick”—a view that one subject can have access to the knowledge of all disparate localities.

But did Frank not listen to and learn from the Khembalis, a community that lost their land due to the sudden sea rise? It turns out that the Khembalis played their role in “[s]aving the world so science can proceed. *The Frank principle*” (Robinson 2007, 3) and, having reconciled with China, went back to Tibet, from where they were exiled long ago. Invested in rebuilding a secluded life in Tibetan tranquility, their voice in global climate action starts to abruptly fade away. And guess who helped the monks and China arrive at an agreement? Phil Chase, of course, assisted the negotiations, while the treaty was signed nowhere other than in Washington, DC, the “*Capital of the world*” (Robinson 2007, 230), making America the oracle of peace and a disseminator of world democracy and drowning Tibet in the shadow of all-American scientocracy. As another ironic twist to the denouement of the Buddhist struggle for self-determination, their long-lost city of Shambhala is freshly excavated by the Chinese, only to “clean it up for visitors, and call it Shangri-La, and hope many tourists will come to see it” (Robinson 2007, 300). Drepung—Robinson’s fictional Buddhist authority figure, identified in the trilogy as a reincarnation of the Panchen

Lama⁷—wholeheartedly encourages the idea and agrees to Frank's observation that "Shambhala is the Buddhist idea of utopia. So, the more this idea is alive in the world, the more people will think about why they are not living in some version of such a place. It stands for a different way of life" (Robinson 2007, 300). Shambhala thus becomes a commodity and a co-opted symbol that devoids the sacred place from what it is supposed to represent—a place of tranquility and remote sanctuary for monks to practice their devotion to an ascetic way of life. Robinson ultimately envisions the Khembalis not as a people interested in maintaining the ascetic tradition of recluse monks but instead as entrepreneurs who will invest in Frank's new company (Robinson 2007, 279).

Finally, Robinson seems to succumb to the pitfall of reducing Buddhism to science and denying its status as a world religion. Robinson (2007, 279) contends:

I think [Buddhism is] more a way of life or a practice than a religion *per se*. Lots of buddhists don't speak about an afterlife. Some do, because they talk about reincarnation and an eternal soul. If you're a materialist, which I am, and you don't believe in eternal souls, then that part of Buddhism is kind of useless.

One of the characters, Charlie, seems like he does not conform to Robinson's materialism. He is afraid that his son Joe has been possessed by an incarnation of a lama and requests that the Khembalis exorcise the spirit, but then again, he "didn't *really* believe that the real Joe had gone away as a result of the Khembalis ceremony for him" (Robinson 2007, 66). Similarly, the ceremonies around Rudra's death to prepare him for a peaceful afterlife and their emotional reconciliation with the impermanence of life made Frank suddenly realize "he was living with aliens. They didn't even look human" (Robinson 2007, 201). Even Drepung says, "I myself think that [incarnation] is a heuristic device only," a metaphor for the many emotional and intellectual cycles of birth and rebirth one undergoes in their lifetime. However, Donald Lopez (2014, 69) argues that modern science is fundamentally at odds with the majority of Buddhist schools, whose followers are "strict dualists . . . on the question of the relation of mind and matter." In order for Buddhism to be compatible with science, it would have to jettison "the dichotomy between mind and matter so central to all Buddhist thought" (Lopez 2014, 77). By envisioning Buddhist monks who renounce this dichotomy, Robinson is painting a distorted image of Buddhism that fits his materialist agenda, while Panchen Lama's framing of incarnation as a "heuristic device" suggests Robinson's inability to accept that Buddhists might not quite fit into the filter isomorphic with his own cognitive matrix and implies a subconscious desire to make Buddhists in the image of his fellow Westerners.

Ultimately, Robinson's (2022) claim that "Buddhism wants to be useful in this world" is a double-edged sword. What kind of world is Buddhism useful for in Robinson's trilogy? Although Buddhist modernist discourse seems to play a

key role in his recalibrated science, it appears to do so only to reposition it at the very top of the global epistemological hierarchy and resuscitate the myth of scientific omnipotence. By repositioning white, male American scientists as the key arbiters of climate change action, Robinson marginalizes the agency of local communities, people of color, and animate and inanimate nonhuman entities. Crucially, by not recognizing that anthropocentrism and racism are the building blocks of “science in the capital,” he ends up reproducing the very logic he is invested in critiquing.

Conclusion

Science in the Capital provides a nuanced critique of the economy of science by emphasizing its complicity in capitalist reproduction and political inertia and its disavowal of ethics, almost succeeding in deconstructing the mythopoeic scientific narrative. Relying on the Buddhist notion of interdependence and emptiness, Robinson shows how science is never a self-enclosed discipline but inherently contingent upon various social and natural matrices. Since the purpose of science is never value neutral, he suggests an ethical approach to doing science whose end goal should always be to reduce human and nonhuman suffering. However, its vision of a reconfigured science does little to diminish scientism’s dominant position. While replacing the players—American science instead of its military and economy—the trilogy still replicates the infrastructure of the global social and political landscapes and affords science with a renewed mythical status. He reproduces anthropocentrism and the redemptive telos of white subjectivity while also replicating the global dominion of scientific innovation. In his attempt to hybridize religious and scientific discourses, he ultimately succumbs to “conciliatory science.”

Robinson’s scientocracy, then, exemplifies a broader tendency among white, American, upper-class converts to appropriate Asian traditions in order to shore up their own cultural authority, a dynamic Gleig has meticulously documented. It is precisely from the vantage point of such communities—white, neoliberal, “rational,” California subjects—that Robinson articulates his vision of engaged Buddhism.⁸ But, as Gleig notes, Buddhism in the United States is multiple, and converts have increasingly begun to incorporate its traditional elements and direct them towards resisting racial, class, and gender injustice. In *Science in the Capital*, Robinson shows little interest in such forms of injustice and instead focuses on fighting capitalism, scientism, and environmental degradation. However, I contend that climate change cannot be conceived of independent of the histories of racism and colonialism, and that climate action must simultaneously address such entanglements if it is to unsettle the very pillars that support the destruction of natural environments.

One way this has been done is through what Riamsara Kuyakanon and colleagues (2022) describe as “cosmopolitical ecologies,” which emphasize context, history, reflexivity, and connection to land. As Astrid Hovden and

Hanna Havnevik (2022), Caroline Humphrey (2022), and Yudru Tsomu (2022) have shown, Buddhist communities across Asia have developed forms of environmental engagement that are grounded in both tradition and political activism. While such communities often collaborate with scientists, their stewardship to land remains rooted in Buddhist tenets such as karma and the personification of nonhuman beings—elements largely discarded in the forms of American Buddhist modernism exemplified by Robinson. Finally, Robinson's trilogy raises a central question for religious and environmental studies: Can Buddhist traditions, once translated into an American idiom, truly be an important agent in climate change response—one that resists scientism and American exceptionalism—or does its very Americanization limit its transformative potential?

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Notes

- ¹ See, for example, David Forbes (2019), Ronald E. Purser (2019), and Evan Thompson (2020).
- ² Many Indigenous communities do not practice institutionalized religion. However, it should be noted that even the term “spiritual” is contested among some Indigenous communities, as there is no separation between the “secular” and the “spiritual” in their cosmologies. For more information, see David Delgado Shorter (2016).
- ³ For another critique of Latour’s flat ontology, see, for instance, Rosi Braidotti 2019. *Posthuman Knowledge*. Cambridge: Polity.
- ⁴ Chapters that announce socio-cultural-natural transformations in the novels are fully italicized. They do not usually involve characters but are reflections on some of the philosophical issues of science and the Anthropocene.
- ⁵ See, for example, Charles Strain (2016).
- ⁶ E.g., Mishuana Goeman’s *Mark My Words: Native Women Mapping Our Nations* published by the University of Minnesota Press in 2013.
- ⁷ “Drepung” is the name of one of the three major Geluk monasteries in Lhasa rather than a personal Tibetan name; Robinson’s use of the term therefore does not reflect contextual, historical use of the name.
- ⁸ Robinson has spent the majority of his life in California. He studied at the University of California, San Diego and currently lives in Davis, California.

Competing Interests

The author declares that they have no competing interests.

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From Cells to the Cosmos: An Integrative Approach to Ontology, Ethics, and Stewardship

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This article presents a philosophical paradigm shift grounded in cellular biology, repositioning life, rather than human consciousness, as the ontological and epistemological foundation for understanding and participating in reality. Drawing on emerging research in bioelectricity, cognition-based evolution, systems biology, and process philosophy, this work explores seven interconnected pillars that together constitute a cell-based paradigm: self-organization, teleodynamic intelligence, bioelectric communication, scaling vitality, observer-participancy, affirmative vitalism, and humble humanism. This shift challenges anthropocentric paradigms by explicating that cellular intelligence exhibits purposive behavior, adaptive problem-solving, and distributed cognition, all without requiring human consciousness or centralized control. It delineates how these systematic principles scale from molecular to planetary and, in all probability, cosmic dimensions, offering novel perspectives on environmental interactions, social organization, and emerging technologies. It is anticipated that this cell-based paradigm, which bridges empirical science and philosophical inquiry, can provide practical guidance for navigating complex systems characterized by distributed intelligence, emergent properties, and creative advancement through pluralistic exploration rather than optimization toward overly simplistic singular solutions.



The Cellular Turn in Philosophy

For millennia, Western philosophy has operated from an unspoken premise: that human consciousness, rationality, and society constitute the proper measure of reality. The Enlightenment giants have continued to centralize the human subject in philosophical thinking, from Descartes ([1641] 1996) to Kant ([1781] 1998), from Hegel ([1807] 1977) to Marx ([1867] 1976). Even as a series of recent Copernican-scale scientific revolutions has uncovered humanity's biological origins and cosmic and/or planetary insignificance, philosophical frameworks have retained their anthropocentric orientation, cementing human consciousness as either the foundation or the summit of reality.

This anthropocentric fixation breeds persistent pathologies (Fowler et al. 2024). The savior complex positions humans as responsible for saving nature through aggressive intervention, often disrupting the very living systems such efforts aim to protect. The guilt complex frames environmental crises as stemming from human exceptionalism, resulting in policies that restrict human flourishing. Ecological blindness, mired in the delusion of seeing humans as external to nature, whether as saviors or villains, obscures our actual role as embedded participants in vast interactive networks of cellular intelligence that have sustained planetary habitability for billions of years.

The cell-based paradigm proposed in this article offers a fundamental reorientation of the field. Rather than beginning with minds contemplating existence, the paradigm starts with cells that enact it. This reorientation builds on a revised assessment of biological reality; that is, before human societies negotiate values, cells coordinate survival of living systems; before human language mediates meaning, cells signal (semiotic) coherence. As the irreducible unit of life known so far, the cell champions self-organization, purposive behavior, and communicative capacity, providing the ontological primitive from which more complex forms of organization, intelligence, and agency emerge. In this respect, the cell-based paradigm represents a particular instantiation of what Gregory Bateson (1972, 1979), Fritjof Capra (1990), and others have called the systemic view. This paradigm recognizes that systemic approaches have long emphasized interconnectedness, emergence, and holistic understanding (Fowler et al. 2024).

This reorientation is timely in light of major scientific breakthroughs that are dethroning neo-Darwinism. Bioelectric morphogenesis (Levin 2021) reveals that developmental intelligence operates through voltage patterns that encode anatomical goals, wherein genetic code has only remote and minimal indirect impact. Cognition-based evolution demonstrates that cells are intelligent agents engaged in natural epistemology, collectively measuring uncertain environments and making adaptive decisions (Miller 2016). The Organic Gaia Theory (de Castro and Lauer 2025; Lovelock 1979; Lovelock and Margulis 1974) provides empirical evidence for planetary self-regulation through microbial biocivilizations

that dwarf the minuscule existence of us *Homo Sapiens* on the new tree of life (Hug et al. 2016). These advances, emerging across biology, systems theory, and complex systems science, converge to vindicate core vitalist intuitions while grounding them in quantifiable processes.

This article articulates the cell-based paradigm through seven interconnected pillars, explores its scaling from molecular to cosmic dimensions, and demonstrates practical applications in environmental stewardship, social organization, and emerging technologies. It maintains that recognizing cellular foundations does not diminish human uniqueness but rather situates our specialized capacities, such as symbolic language, technological innovation, institutional memory, and intentional stewardship, within the broader creative advance of life.

It should be noted that this article follows William B. Miller (2016, 2023) in framing the terms, including “consciousness,” “intelligence,” “cognition,” and “life,” collectively as distributed information processing and adaptive decision-making emerging from autopoietic self-organization, plus reproductive capacity (Maturana and Varela 1980). This encompassing framing accounts for the complex reality that precise labeling and scaling remain contentious and debated in the field. This framing keeps the focus on the paradigm’s core ontological shift.

The Seven Pillars

The cell-based paradigm is founded on seven interconnected principles, illustrated in Figure 1. As I detail in the following, the first three establish empirical foundations describing what cells demonstrably are and do, the next two bridge science and philosophy to unravel how cellular principles apply universally and what this means for knowledge itself, and the final two provide metaphysical and ethical interpretations of how cell-based insights transform our understanding of existence and our role within it.

Pillar One: Self-Organization (Ontology)

Cells spontaneously create order from disorder through thermodynamic imperatives, exhibiting autonomous boundary maintenance and metabolic coherence. The plasma membrane self-assembles through hydrophobic forces, while the cytoskeleton dynamically polymerizes to maintain its shape. Metabolic networks, as described by H. Jeong et al. (2000), coordinate thousands of reactions without centralized command. This Kauffman (1993) self-organization mechanism challenges both mechanistic reductionism, which reduces cells to deterministic chemical reactions and mindless, minuscule machines, and teleological design, which requires external intelligence to impose organization.

Jeremy L. England’s (2013) dissipation-driven adaptation demonstrates that, under sustained energy input, matter naturally reorganizes to capture and dissipate energy as heat more efficiently. He suggests that life’s emergence may be thermodynamically expected rather than astronomically improbable.



Figure 1: The seven pillars of the cell-based paradigm. This concentric diagram shows the seven pillars of the cell-based paradigm and their interconnections. The central hub represents life-centric ontology, with each pillar maintaining both autonomy and integration within the larger framework.

In contrast, James M. Tour's (2016) challenge for origin of life researchers reveals profound gaps in our current understanding of living systems: chirality problems where life uses only left-handed amino acids despite abiotic synthesis producing both, hydrolysis issues where water breaks down biomolecules faster than they form, and sequencing requirements where functional proteins need specific amino acid orders that random assembly cannot achieve.

Rather than viewing these gaps as temporary embarrassments awaiting mechanistic explanation or as evidence for intelligent design, the cell-based paradigm elevates them as constitutive features: fertile voids that enable creative advancement, improbabilities that testify to life's extraordinary nature, and mysteries that counsel epistemic humility. Self-organization reveals being as autopoietic becoming (Maturana and Varela 1980), self-producing and self-maintaining yet irreducibly complex, with gaps that resist explanatory closure while enabling pluralistic exploration (Noble and Noble 2023).

Pillar Two: Teleodynamic Intelligence (Cognition)

Cells exhibit purposive behavior through distributed information processing, which involves measuring environmental uncertainty, making adaptive decisions, and solving problems collectively, without the need for centralized control or conscious awareness imagined by humans. This teleological propensity is extensively discussed in the edited book *Evolution "Purpose": Teleonomy in Living Systems* (Corning et al. 2023). In his cognition-based evolution framework, Miller (2016, 2023) pioneers the idea that cells are intelligent agents engaged in natural epistemology. Cells sense environments through receptor networks, integrate information via signaling pathways, store memories through epigenetic modifications (Jablonka and Lamb 2014), communicate through chemical and electrical signals, and make decisions manifested in altered gene expression and behavior.

Studies in *Arabidopsis thaliana* (Monroe et al. 2022) reveal a mutational bias that decreases mutations in essential genes, with evidence that cells actively manage genome integrity rather than experience purely random variation. Michael Levin's (2021) research shows that cells collectively compute developmental goals: voltage patterns across tissues encode morphological targets that cells achieve through coordinated proliferation, migration, and differentiation. Planaria regenerating heads according to bioelectric memories (Levin et al. 2017) that persist across multiple regenerations (Sánchez Alvarado and Tsonis 2006) without undergoing genetic changes provides evidence that cognition operates through information processing embedded in material substrates.

This teleodynamic intelligence dissolves the mind–body dualism (Descartes [1641] 1996; Chalmers 1996) that has plagued the Enlightenment philosophy since Descartes. Since cells are endowed with purposive intelligence without consciousness, the mind is then no longer a separate substance mysteriously inhabiting specific material substrates but rather a spectrum of organizational properties available in all adaptive systems. Cognition becomes a matter of degree and kind rather than simply being present or absent. Such a realization questions those anthropocentric claims that only humans or animals with brains are capable of genuine intelligence.

Pillar Three: Bioelectric Communication (Relationality)

Cells coordinate through non-linguistic channels, including voltage gradients, chemical signals, and gap junction networks, to mobilize coherent collective actions that overcome the deceptions and decontextualization inherent in human symbolic language (Goodenough and Paul 2009). Bioelectric patterns serve as morphogenetic memories that encode anatomical goals and guide development through distributed computation across tissues. For example,

during wound healing, cells at the injury site undergo rapid depolarization, which emits electrical signals that propagate through gap junctions to trigger coordinated responses across surrounding tissues (Zhao 2009).

This bioelectric communication provides materially embedded, context-preserving signaling that contrasts sharply with human language's progressive decontextualization through writing, printing, and digital media. Henri Bergson's ([1907]1944) critique of human language—i.e., words spatialize the flow of duration, slicing continuous becoming into discrete categories—applies to symbolic representation but not to bioelectric signaling. Voltage gradients and ion fluxes convey information through direct physical continuity. The signal remains inseparable from its source's metabolic and developmental state, preventing the “orphaning” of meaning that Plato warned writing causes or, as Bateson (1979) emphasized in Alfred Korzybski's famous utterance, “the map is not the territory.”

Cells cannot miscommunicate through ambiguous interpretation, unlike humans, who can cope with decontextualized text. Either a voltage change reaches the threshold to open ion channels, or it does not. The biophysics in this respect is deterministic. Arguably, this is not a crude mechanism lacking subtlety; complex bioelectric networks integrate multiple signals, producing context-dependent outcomes that exhibit sophisticated computation without symbolic mediation (Clawson et al. 2019). This reveals relationality as ontologically primary: cells define themselves through communicative exchanges rather than existing as preformed entities that subsequently interact.

Pillar Four: Scaling Vitality (Universality)

The same principles that operate in cells—self-organization, distributed cognition, and bioelectric communication—scale upward to organisms, ecosystems, planetary biospheres, and potentially cosmic structures, revealing life (the interconnected nature of things) as a universal yet pluralistic phenomenon that exhibits fractal organization across scales. The Gaia hypothesis (Lovelock 1979; Lovelock and Margulis 1974), updated through the 2025 Organic Gaia Theory (de Castro and Lauer, 2025), posits that the Earth functions as a self-regulating planetary system, where life and the abiotic environment co-evolve to maintain habitability through the distributed intelligence of microbes. Drawing upon his biocivilizations framework, Predrag Slijepčević (2023) further elaborates that the biosphere operates as a distributed intelligence. Microbial communities engage in natural epistemology at scales ranging from cellular to planetary, while maintaining biogeochemical cycles through feedback mechanisms analogous to cellular homeostasis.

Atmospheric oxygen levels, stabilized by photosynthetic bacteria (i.e., cyanobacteria) for billions of years despite vast perturbations, are evidence of planetary-scale regulation (Margulis and Sagan 1997). This scaling reveals

nested hierarchies, or what Arthur Koestler (1968) termed “holarchies,” where each level simultaneously exhibits wholeness, possessing emergent properties, and partness, contributing to higher organizational levels.

A recent proposal of biocentrism (Lanza and Berman 2009) extends this concept cosmically. Biocentrism argues that consciousness participates in actualizing reality through observation, with the role of quantum measurement in collapsing superpositions potentially scaling to cellular bioelectric networks as fundamental observation sites. This conceives of a cosmos laced with proto-conscious processes where stars form through gravitational collapse, selecting among quantum fluctuations, and galaxies organize through feedback between dark matter and baryonic gas, which exhibits creativity at all levels without requiring literal consciousness. While cellular principles scale across organizational levels, it should be acknowledged that not all physical systems at all scales exhibit these properties, although recently the constructal law suggests that even elementary particles, simple molecules, crystals, and other abiotic self-organizing systems may possess the adaptive capacity and information processing that characterize living systems (Miller et al. 2025).

This understanding resonates with Thomas Berry’s (2009) observation that each component is universe-referent, and all components are inter-referent among themselves. It parallels David Bohm’s (1980) concept of the implicate order, where information is holographically represented in observed phenomena. Wisdom traditions, including the Hindu concept of Indra’s net, where everything reflects everything else, articulate similar insights into fundamental interconnectedness.

Pillar Five: Observer-Participancy (Epistemology)

Observation accounts for preexisting reality but does not reveal it. Observation participates in actualizing reality not through consciousness per se but through physical interaction. Quantum measurement demonstrates that physical systems interact to produce determinate outcomes from indeterminate possibilities. The observer need not be conscious; e.g., a measuring device or even another particle suffices. This point is essentially epistemological: reality emerges through interaction and relationship, not through passive revelation of preexisting states. Cellular bioelectric networks serve as fundamental observation sites that process information, reducing indeterminacy to definiteness and selecting among possibilities. Quantum mechanics’ measurement problem demonstrates that observation plays an active role in determining outcomes. When electrons pass through double slits without being observed, they create interference patterns characteristic of wave behavior; when followed, they produce patterns characteristic of particle behavior (Feynman 1965).

This is not merely an epistemological disturbance but an ontological participation in determining what exists. Cellular decisions, such as when to

divide, differentiate, or migrate, involve bioelectric computation that integrates multiple uncertain inputs and produces definite outcomes. According to Leopold Infeld's (1980) recollection, Einstein repeatedly remarked, "God does not care about our mathematical difficulties. He integrates empirically." This reduction of ambiguity to specificity through information processing at boundaries distinguishing inside from outside parallels the reduction of superposition to an eigenstate in quantum measurement. For instance, as detailed in the later section Environmental Interaction through Humble Participation, applied to environmental stewardship, observer-participancy (Wheeler 1983) reveals that coral reef health measurements do not neutrally describe preexisting states but actively participate in actualizing possibilities by influencing resource allocation, policy priorities, and collective attention.

This inverts conventional epistemology, where knowledge involves subjects passively apprehending objects, with truth consisting of correspondence between mental representations and independent external reality. If observation participates in actualizing what exists, then the subject-object distinction blurs: knowers are co-creators of known reality through acts of measurement, categorization, and attention and (most importantly) the consequences of participation. This does not collapse into solipsism because observation operates through physically constrained processes following probabilistic rules and biophysical laws.

Pillar Six: Affirmative Vitalism (Metaphysics)

Life advances through Bergson's ([1907] 1944) creative evolution, which favors affirmative addition and inventive leaps that generate genuine novelty, rather than Hegelian negating dialectics, where progress occurs through oppositional conflict and sublation (Hegel [1807] 1977). For Bergson, Hegel's dialectic (thesis, antithesis, and synthesis) retrospectively reconstructs development as a logical progression through negations, thereby dismissing genuine creation. Real becoming does not proceed through contradictions resolved by synthesis; it advances through positive, unpredictable invention. The negation is an intellectual artifact imposed after the fact, not an ontological driver. It may appear plausible in stable successions but may fail to account for drastically disruptive contingencies. Mass extinctions, discussed in later section Extinctions as Creative Resets, are the battleground for this dispute, which Bergson won, as they prune rigid structures while recycling biomass into resources for evolutionary radiations. Paradoxically, extinctions are evidence for creative destruction that affirms life's "élan vital" (i.e., life's vital impetus) through pluralistic exploration rather than negating obsolete forms.

The 2024 discovery of nitroplast, a nitrogen-fixing organelle arising from bacterial-algal endosymbiosis, provides evidence that procreative evolution continues in real time (Coale et al. 2024). A free-living cyanobacterium

merged with an algal host, losing autonomy but gaining a stable energy supply while providing nitrogen fixation, creating a novel organelle analogous to mitochondria or chloroplasts. This was not a gradual accumulation of small changes but a punctuated leap: a sudden integration that generated emergent capabilities through symbiotic merger. Life emerges not despite but through improbabilities, exploring possibility spaces that mechanisms alone cannot navigate. This metaphysics implies reality has a fundamental creative quality rather than simply being deterministic or teleological. That said, indicative of the existence of genuine alternatives, adaptive learning and creative exploration do not definitively rule out that selections are determined by factors we cannot predict. While the cell-based paradigm makes free will more plausible than strict determinism, it does not entirely resolve this ancient philosophical puzzle.

Pillar Seven: Humble Humanism (Ethics)

Humans are embedded cellular participants in life's relational weave, not external sovereign controllers. We are holobionts: each of us is a walking ecosystem, comprising roughly equal numbers of human and bacterial cells, with trillions of microbial symbionts regulating immunity, metabolism, and even neurotransmitter production (Desikan and Rangnekar 2024; Koestler 1968). This biological fact undermines claims of human autonomy or sovereignty: we do not even exist as single organisms, let alone beings transcendent of nature.

In this respect, it is reasonable to infer that our uniqueness lies in our specialized capacities; that is, symbolic language enables cultural transmission across generations, technological innovation accelerates adaptation beyond evolutionary timescales, institutional memory preserves collective knowledge through writing and law, and intentional stewardship allows deliberate coordination toward articulated goals (Laland and Seed 2021). These capacities are real and valuable, emerging from neural complexity and cultural accumulation, which are unavailable to organisms lacking our cognitive and social capabilities.

Humble humanism positions human welfare as one thread within the biospheric plurality rather than as a central measure of value, generating policies that affirm flourishing through adaptive participation rather than imposing rigid controls based on incomplete observations and decontextualized categories. Like cellular membranes, which maintain boundaries while enabling exchanges, humanistic policy establishes protections for human welfare while recognizing interdependence with ecological systems, requiring cooperative management rather than exploitative domination or guilt-driven abnegation.

In brief, these seven pillars form a coherent philosophical framework. The first three establish empirical foundations: cells self-organize ontologically, exhibit intelligence cognitively, and communicate relationally. The next two bridge to broader implications: cellular principles scale universally, observation participates epistemologically. The final two provide interpretive frameworks:

life advances vitally, humans participate humbly. Each pillar supports the others: self-organization enables intelligence, intelligence employs communication, these principles scale universally, observation participates through information processing, and this actualization is creative. Human ethics follow from embedded participation.

Together, these pillars offer a comprehensive worldview, repositioning life not as human consciousness, but as an ontological and epistemological foundation, reshaping how we understand reality as a process, not a substance, knowledge as participatory, not spectatorial, and ethics as embedded, not sovereign. This framework generates novel perspectives on traditional philosophical problems: the mind–body problem dissolves through graduated prehension, free will versus determinism is resolved through creative selection among alternatives, and meaning and purpose emerge from participation in creative advance rather than requiring external validation or teleological endpoints.

Planetary Vitality

If individual cells pulse with improbable vitality, what emerges when trillions aggregate across planetary scales? This section examines how cellular intelligence scales to maintain planetary habitability through distributed cognition operating across biogeochemical cycles without centralized command.

Gaia as a Distributed Cognitive System

The Gaia hypothesis sees the biosphere as a self-regulating system: life interacts with abiotic realms to maintain habitability, much like a cell's membrane negotiates gradients. The weak Gaia hypothesis that life and environment co-evolve to maintain habitability enjoys broad scientific support. The strong Gaia hypothesis remains contested in that it ventures to reframe the Earth as an emergent superorganism through organic emergence from geochemical feedback loops, sustainability via co-evolutionary dynamics, and evolutionary transitions driven by biotic innovations (Lovelock 1979; Lovelock and Margulis 1974), such as plant-fungal symbioses that modulate ice ages (Field et al. 1998). The proposed framework draws on recent work (de Castro and Lauer 2025) proposing an Organic Gaia Theory that attempts to bridge these positions.

Inspired by the Gaia hypothesis, Slijepčević (2023) deepens our understanding by framing the biosphere as a network of cognitive agents engaged in natural epistemology. Bacteria created information highways connecting settlements three billion years ago, with elements of complex civilizations such as bioelectric networking (communication), bacterial antibiotic regulation (agriculture), distributed metabolic experimentation through quorum sensing (science), optimized fractal patterning in biofilms (art), and antibiotic production by actinobacteria (medicine) that had existed for billions of years before human beings appeared.

The Gaian system practices hyperthought, which artificial intelligence (AI) systems based on reinforcement learning attempt to emulate (Sutton and

Andrew 1998). Hyperthought features decentralized trial-and-error problem-solving, where microbes conduct metabolic experiments, preserving successful strategies through horizontal gene transfer and symbiotic partnerships. Each bacterial colony measures nutrient gradients, each fungal network redistributes resources between trees, each coral reef buffers ocean chemistry, all contributing to planetary cognition without requiring global coordination or unified purpose. The system learns through massively parallel experimentation: countless organisms test strategies, with successful innovations spreading horizontally through gene transfer or vertically through inheritance. In contrast, unsuccessful ones are weeded out by selection or extinction.

Persistence through Distributed Intelligence

Biosphere's resilience across extinction events and environmental perturbations reveals a fundamental principle distinguishing living systems from engineered ones: distributed intelligence operating through redundancy rather than optimized efficiency. Contemporary technological systems pursue optimization, i.e., maximizing output per unit input, minimizing redundancy, implementing just-in-time logistics, and eliminating buffer stocks. This engineers the trap of brittleness: supply chain disruptions cascade into shortages, grid failures spread across regions, and monoculture agriculture collapses under novel pathogens.

Living systems maintain costly redundancy and functional overlap, which appears wasteful under optimization metrics but proves essential for long-term persistence. Bacteria maintain multiple metabolic pathways for energy acquisition, despite the efficiency costs; horizontal gene transfer distributes adaptive alleles across microbial communities more rapidly than vertical inheritance permits. Soil microbial communities collectively process complex organic matter through metabolic handoffs, where one species breaks down cellulose, another ferments sugars, and a third metabolizes acids.

This distributed cognition enables biospheric hyperthought: solving global problems through decentralized experimentation without centralized coordination. Ocean acidification driven by anthropogenic CO₂ threatens calcium carbonate shell formation; yet, within affected populations, genetic variants more tolerant to low pH exist at low frequencies. As acidification intensifies, these variants increase through natural selection (Darwin 1859), with populations evolving higher pH tolerance within decades. Meanwhile, some lineages adopt alternative skeletal materials, others reduce calcification costs, and still others shift their depth distributions (Bitter et al. 2019).

Extinctions as Creative Resets

Mass extinctions occupy a paradoxical position: catastrophic events that eliminate species accumulated over millions of years yet are consistently followed by evolutionary radiations that generate greater diversity than existed before. Five major extinctions identified in the fossil record each eliminated 50–95% of

species, devastated ecosystems, and reset evolutionary trajectories. However, within millions of years following each event, biodiversity (Wilson 1992) not only recovered but also surpassed pre-extinction baselines, with novel body plans, ecological strategies, and functional innovations that were previously absent. The end-Permian extinction eliminated 95% of marine species and 70% of terrestrial vertebrates (Benton 2003). Dominant Paleozoic clades perished—trilobites that had been thriving for 270 million years, rugose corals that had been building reefs for 200 million years. Nevertheless, their ecological roles opened as possibilities for survivors.

Early Triassic oceans underwent explosive radiation: ammonoids diversified into niches formerly occupied by nautiloids; scleractinian corals evolved reef-building capabilities, replacing rugose corals; and ichthyosaurs and plesiosaurs explored predatory niches vacated by Paleozoic apex predators. This creative dynamic does not negate extinct clades but transmutes their evolutionary investments. Trilobite exoskeletons dissolve, releasing calcium and carbonate into the ocean's chemistry—coral frameworks fragment, creating rubble habitats that are colonized by opportunistic species. Terrestrial forests burn, converting biomass to ash and fertilizing subsequent plant growth. This process bears some resemblance to the conversion of organic fossil energy resources, such as coal and oil, which powered the waves of modern industrialization.

Extinctions prune rigid structures that evolved through incumbency advantages, recycle biomass into resources, and open ecological roles for creative exploration, generating greater diversity following recovery than existed before the perturbation. Contrary to mainstream perception, extinctions uphold affirmative vitalism's principle of creative advance through addition rather than negation dialectics. Amid the current anthropogenic extinction event, which is proceeding at unprecedented rates, humans bear responsibility for ecosystem stewardship and should pursue conservation, habitat protection, and emissions reductions. However, we should resist framing this in apocalyptic terms that position humans as either Earth's saviors or destroyers. For instance, the Great Oxidation Event, wherein cyanobacterial metabolism caused Earth's most catastrophic extinction, ultimately enabled complex life. Moreover, our temporal limitations prevent confident predictions about evolutionary outcomes across geological timescales. Humble humanism recognizes both genuine human responsibility and profound uncertainty about life's creative response to perturbation across scales that dwarf human civilization's existence.

Cosmic Implications and Observer-Participancy

If cellular principles scale to planetary Gaia, do they extend further still, even to cosmological scales? This section explores how biocentrism, fine-tuning, and exoplanetary Gaia frame ultimate questions about life's place in the universe through cellular ontology, recognizing the cosmic scope of vitality.

Biocentrism and Fundamental Observation

Biocentrism inverts the conventional materialist hierarchy by positing life and proto-consciousness as the foundation of reality rather than byproducts of it (Lanza and Berman 2009). It asserts that observation does not passively reveal pre-existing states but actively participates in their actualization. The famous double-slit experiment reveals a key insight: when observers watch subatomic particles pass through slits, they behave like bullets, passing through one slit or the other. When unobserved, they exhibit wave behavior, passing through both slits simultaneously, creating interference patterns that are only sensible if particles explore both paths.

Orthodox quantum mechanics (Bohr 1958; Wheeler 1983) interprets wave-function collapse as a result of observation, thereby forcing superposed states into definite states. However, this raises questions: What counts as observation? Must observers be conscious? In contrast, biocentrism advocates a radical interpretation: that observation fundamentally contributes to the actualization of reality, stemming from the principle of quantum indeterminacy discussed previously. The observer and the universe are correlative: space and time constitute continuums of consciousness rather than independent substrates.

Crucially, biocentrism does not require brains or neural complexity as a foundation for consciousness. Robert Lanza and Bob Berman (2009) invite us to imagine that consciousness collapses quantum possibilities into classical actualities, and this capacity scales across organizational levels. In this scenario, cellular bioelectric networks capable of processing information, making decisions, and exhibiting proto-cognitive capacities may constitute fundamental observation loci. Bioelectric computations guiding morphogenesis—as well as parallel quantum measurement, which selects among superposed states—both involve information processing, reducing indeterminacy to definiteness, ambiguity to specificity, and possibility to actuality.

Fine-Tuning and Thermodynamic Creativity

The universe's fundamental constants appear exquisitely calibrated for carbon-based life (Meyer 2021). Alter gravity's strength by one part in 10^{40} and stars either burn too quickly for planets to form or never ignite fusion; shift electromagnetic force slightly and complex chemistry becomes impossible; adjust the strong force minutely and carbon synthesis in stellar cores fails. These narrow viable ranges generate a philosophical trilemma: necessity (constants could not be otherwise due to unknown physical principles), chance plus anthropic selection across a vast multiverse, or intentional design calibrating constants for life. The cell-based paradigm reframes this trilemma by honoring improbabilities as fertile voids, enabling creative exploration rather than mysteries demanding closure.

The thermodynamic approach demonstrates that self-organization necessarily emerges (Kauffman 1993; England 2013) as matter dissipates energy, with thermodynamics biasing molecular exploration toward configurations that efficiently harvest and release energy. This explains why organized complexity arises without requiring design: thermodynamic imperatives channel chemical exploration toward dissipative structures (Prigogine and Nicolis 1984). That said, thermodynamics alone does not eliminate improbability or the God thesis revisited in Meyer's (2021) work; instead, it contextualizes it. Thermodynamics makes self-organization probable while leaving specific outcomes underdetermined. Dissipative structures, such as membrane-bounded protocells, autocatalytic RNA networks, and iron-sulfur metabolizers, emerge from historical contingencies and creative exploration within thermodynamic constraints. Fine-tuning represents one actualized thread among countless unrealized possibilities, affirmed through existence without requiring explanation from necessity, chance, selection, or intention.

Exoplanetary Gaia and Detection Limits

If Earth's biosphere exhibits planetary-scale cognition, do exoplanets harbor Gaia operating through alternative chemistries, unfamiliar metabolisms, and organizational principles beyond terrestrial experience? The detection challenge exposes profound epistemological limits: our search strategies, biosignature catalogs, and habitability criteria systematically favor Earth-like life while obscuring alien vitalities that vastly outnumber familiar carbon-based cells.

The concept of the habitable zone, defined as the orbital distance range where liquid water exists on planetary surfaces, privileges terrestrial biochemistry's solvent while excluding alternatives (Kasting, Whitmire, and Reynolds 1993). Ammonia remains liquid at much lower temperatures, expanding the habitable zones around cooler stars (Bains, Petkowski, and Seager 2024). Methane and ethane form lakes on Titan, demonstrating that nonaqueous solvents enable complex chemistry (Stofan et al. 2007). Super-critical CO₂ might function as a solvent on high-pressure super-Earths (Budisa and Schulze-Makuch 2014). By defining habitability through water's temperature range, we exclude worlds where life uses alternative solvents our Earth-trained intuitions do not recognize as viable.

Biosignature detection similarly favors familiar metabolism. Oxygenic photosynthesis suggests the presence of oxygen, while the combination of oxygen and methane implies that biological methane production is overwhelming abiotic sources (Krissansen-Totton, Bergsman, and Fortney 2022). Not surprisingly, these signatures assume an Earth-like metabolism, with photosynthesis producing oxygen and methanogenesis generating methane. Alternative metabolisms might produce different signatures: silicon-based life, for example, could exhale silicon tetrachloride rather than CO₂ (Petkowski,

Bains, and Seager 2020), while plasma-based organisms might emit characteristic electromagnetic spectra (Tsytoich et al. 2003). Subsurface biospheres generate no detectable atmospheric signatures while maintaining deep crustal ecosystems undetectable through telescopic observation.

The observer fallacy haunts assessments that declare worlds lifeless based on the failed detection of Earth-like signatures while overlooking cryptic adaptive processes. Mars may host deep biospheres kilometers below the surface, where geothermal gradients maintain liquid water and chemosynthetic communities metabolize hydrogen and iron, which are undetectable by rovers sampling surface soils (Tarnas et al. 2023). Venusian clouds at a fifty-kilometer altitude maintain Earth-like temperatures and pressures despite the surface inferno; proposals for aerial microbes metabolizing sulfur compounds remain viable (Limaye et al. 2018). Declaring these worlds definitively dead contradicts cellular ethics: life operates through pluralistic strategies that our anthropocentric frameworks systematically miss.

Environmental, Social, and Technological Applications

The cell-based paradigm generates practical principles for navigating concrete challenges across environmental stewardship, social organization, and emerging technologies. This section demonstrates how cellular wisdom—encompassing distributed intelligence, adaptive management (Walters 1986), selective boundaries, and creative evolution—can inform policy, addressing complex systems characterized by emergent properties and unpredictable consequences.

Environmental Interaction through Humble Participation

Environmental management, presuming a comprehensive understanding, systematically fails when human agents treat dynamic processes as static states. Declaring ecosystems “healthy” or “degraded” from a human standpoint imposes discrete categories on continuous adaptive processes, obscuring creative flow where organisms continuously adjust through distributed intelligence. Bateson (1972) identified this problem as a “conscious purpose,” arguing that human enterprises tend to pursue narrow goals while ignoring systemic consequences; e.g., medicine saves human lives while contributing to overpopulation and resource depletion. Cellular wisdom, by contrast, operates through distributed intelligence that inherently accounts for systemic effects.

As a case in point, coral reefs, which have been around for over 500 million years and have endured drastic geological events (Veron 2000), do not transition discretely from “healthy” to “bleached” to “dead” through step functions. On the contrary, they exhibit continuous duration, in which polyps integrate temperature signals with metabolic states, experiment with symbiont combinations, adjust calcification rates, and modulate tissue thickness, all of which are invisible to annual surveys.

Cellular intelligence operationalizes epistemological humility through concrete practices that human environmental management can emulate (Fowler et al. 2024). While bacteria navigating nutrient gradients do not conduct annual surveys, they continuously monitor internal states and external conditions through receptor networks to provide real-time feedback. In a similar vein, human environmental monitoring should encompass continuous data collection through satellite remote sensing, tracking vegetation dynamics, sensor networks that measure water quality, citizen science engagement with communities, and traditional ecological knowledge, incorporating multi-generational experience.

Adaptive, interactive management principles derived from cellular intelligence include but are not limited to: continuous measurement rather than periodic assessment, distributed processing rather than centralized analysis, feedback adjustment rather than plan execution regardless of outcomes, maintaining alternatives rather than optimizing single solutions, modular organization preventing localized failures from cascading globally, and learning from failures rather than concealing them (Holling 1978; Walters 1986; Williams and Brown 2014). These principles generate protocols that treat interventions as experiments with defined success metrics, monitor outcomes, and adjust approaches based on results rather than defending predetermined plans. This balances stewardship responsibility with epistemological humility about our observational limits—a core thesis of this article.

Borders as Cellular Membranes

Cellular membranes provide an instructive analogy for understanding national borders, challenging both absolutist positions—(a) open borders requiring unrestricted flow, and (b) closed borders demanding isolation—by revealing how selective permeability enables flourishing. Cell membranes are not fortress walls that exclude all external influence, nor are they nonexistent boundaries that permit indiscriminate passage. Instead, they constitute sophisticated regulatory systems that maintain internal conditions necessary for cellular function while enabling exchanges with the environment that are essential for metabolism, growth, and communication (Alberts et al. 2014).

Membrane selectivity operates through multiple coordinated mechanisms: (1) passive diffusion allowing small nonpolar molecules to cross freely following concentration gradients; (2) facilitated diffusion utilizing protein channels, enabling specific polar molecules to cross based on concentration gradients while excluding others; (3) active transport pumping molecules against gradients using ATP energy, maintaining concentration differences essential for cellular function; and (4) receptor-mediated endocytosis enabling selective uptake of macromolecules through recognition and internalization (Cooper and Hausman 2013).

Regarding borders, the cellular membrane analogy suggests several key principles. First, selectivity serves a legitimate function. Because cells distinguish beneficial from harmful substances through evolved receptor systems, it is only logical to conclude that nations (a composite of cells) are endowed with the legitimacy to establish immigration criteria based on security concerns, economic needs, cultural compatibility, and absorptive capacity. Second, exchange proves essential. Since completely impermeable membranes kill cells by preventing the import of nutrients and the export of waste, absolute border closure would strangle economies that depend on trade, tourism, labor mobility, and cultural exchange. Third, context determines appropriate permeability: red blood cells maintain relatively simple membranes that permit oxygen exchange, while neurons require complex channels that enable electrical signaling. Similarly, island nations with fragile ecosystems have a legitimate reason to maintain stricter border controls than continental nations with diverse environments and large populations. Ironically, this complex mechanism of cellular membranes pokes fun at free-market and free-trade purists, whose biological ignorance leads to an erroneous anti-economics assumption of human homogeneity. In truth, just like cells, no two humans are the same; like cells, all humans are humans just as all cells are cells. All parts of reality fall into such categories.

Embodied and Life-Serving Artificial Intelligence

The development of AI raises fundamental questions about the nature of cognition, its ethical status, and its appropriate relationship with biological intelligence. Current AI discourse oscillates between apocalyptic fears of superintelligent AI destroying humanity and utopian hopes of AI solving all problems, both treating intelligence as an abstract computational capacity divorced from embodiment, evolution, and ecological embeddedness, even in the eyes of AI founding fathers like Richard Sutton (for more details, see Dwarkesh Patel's 2025 interview at <https://www.youtube.com/watch?v=21EYKqUsPfg>). Cellular cognition offers an alternative framework, recognizing intelligence as an evolved capacity for purposive behavior through information processing that operates across scales, from molecules to minds and galaxies.

Cells exhibit cognitive capacities without possessing humanlike brains, consciousness, or symbolic representation. Numerous cellular behaviors—such as bacterial chemotaxis (which navigates nutrient gradients; Wadhams and Armitage 2004), immune systems (which distinguish pathogens from symbionts; Taniguchi et al. 2019), and embryonic development (which constructs bodies based on bioelectric patterns; Levin 2012)—evidence cognition operating through embodied processes rather than abstract computation.

Applying the cellular perspective to AI unfolds several principles. First, intelligence requires embodiment, with cognitive capacities evolving for situated

action in physical environments rather than abstract reasoning divorced from consequences. Second, intelligence exhibits multiple forms suited to different ecological niches and evolutionary histories rather than a single dimension reducible to processing speed or pattern recognition. Third, intelligence serves life through biological cognition, which evolves for the purposes of survival, reproduction, and flourishing within ecological networks (Bascompte 2009) rather than abstract goals or universal optimization.

These principles suggest that AI development priorities should emphasize embodied, diverse, life-serving, constrained, and developmentally grounded approaches rather than pursue abstract superintelligence divorced from physical reality. Robotics, which integrates AI with physical bodies, forces us to grapple with energy limits, mechanical constraints, and environmental interactions, basing cognition in material reality. Specialized AI addressing specific domains can develop expertise without requiring general intelligence or wisdom, which can potentially lead to misaligned goals. AI assists human decision-making rather than replacing it, maintaining human oversight and ensuring value alignment through iteration. Gradual capability development, combined with extensive testing, enables the detection of problems before scaling rather than deploying robust systems whose behaviors remain unpredictable.

Enhancement within Constraints in Biotechnologies

CRISPR (clustered regularly interspaced short palindromic repeats) gene editing and related biotechnologies enable the unprecedented manipulation of life's genetic foundations, raising profound questions about the appropriate uses of powers that modify organisms, including humans (Doudna and Charpentier 2014). Therapeutic applications that correct disease-causing mutations appear beneficial, at least in the near term; enhancement applications that improve normal functions or add novel capabilities, however, raise concerns about safety, equity, and the alteration of human nature. Cellular wisdom about the integrated complexity of evolved systems (Bateson 1979) informs our navigation of these tensions.

Tour's improbabilities regarding abiogenesis chemistry gain renewed significance for genetic engineering. Suppose life's origins involved transitions exhibiting vanishingly small probabilities from a mechanistic perspective. In that case, cellular systems may exhibit exquisite integration, where alterations propagate unforeseen consequences through epistatic networks that are only partially understood. Gene editing, assuming a simple causation—one gene, one trait—risks disrupting the complex regulatory architecture wherein genes interact through epigenetic feedback loops, compensatory mechanisms, and context-dependent effects (Aksoy et al. 2020).

Cellular ethics navigates tensions through several principles. First, distinguish therapy from enhancement: interventions that restore normal function to diseased

systems work within biological norms, while enhancements that transcend species-typical capacities push beyond evolved constraints (Brokowski and Adli 2019). Second, prioritize somatic over germline editing so that modifications affect only the treated individual (Gyngell, Bowman-Smart, and Savulescu 2022). Third, require that extensive preclinical evidence (e.g., animal models, cell culture systems, and computational predictions) should demonstrate safety and efficacy before editing humans to mitigate potential off-target effects, epistatic interactions, developmental perturbations, and long-term consequences (Aksoy et al. 2020). Fourth, maintain a gradual, staged deployment that enables learning from experience rather than committing to interventions whose consequences remain uncertain (Brokowski and Adli 2019). Lastly, ensure equitable access, especially when genetic modifications provide genuine benefits (Gyngell, Bowman-Smart, and Savulescu 2022).

Philosophical Foundations and Contrasts

The empirical foundations of the cell-based paradigm require explicit philosophical grounding, which distinguishes its position within the broader metaphysical landscape. This section explores the relationships between cellular principles and major philosophical traditions, particularly Bergsonian creative evolution and Whiteheadian process philosophy, in contrast to mechanistic reductionism and Hegelian dialectics.

Bergson's Duration and Creative Evolution

Bergson's philosophical project challenged both mechanistic materialism, which reduces life to chemical determinism, and teleological finalism, which requires intelligent design. His central concept, "duration" (*la durée*), reconceptualizes time not as a spatial succession of discrete moments but as a continuous qualitative flow where the past persists as memory, the present actualizes through creative selection, and the future remains genuinely open to unpredictable novelty. This temporal ontology generates a corresponding metaphysics: reality as an ongoing, creative advance, where genuine novelty emerges through "élan vital" rather than through the mechanical recombination of pre-existing elements or the actualization of predetermined potentials.

Bergson criticized the mechanism for rendering change illusory. In his eyes, if all development exists potentially in preceding forms where every complex structure is derivable in principle from initial conditions plus deterministic laws, then evolution merely reveals what was always latent, making genuine creation impossible. Traditional finalism fares no better: if evolution aims toward predetermined goals, then outcomes exist ideally before actualization, rendering change illusory again. Both commit the same error: treating the present and the future as logically contained in the past, denying that time adds anything genuinely new.

Bergson's alternative embraces duration as a creative addition. In this creative addition, the past does not vanish but persists as memory, not merely human psychological memory but ontological memory, where accomplished facts constrain but do not determine future possibilities. Each moment inherits its past while contributing novelty through selection among incompatible alternatives that physical law leaves open. A cell encountering a nutrient gradient does not merely execute mechanical tropism; it integrates its current metabolic state with historical experiences, measures environmental uncertainty through receptor networks, and chooses among adaptive responses, the outcomes of which remain unpredictable because selection operates through distributed computation across molecular networks rather than through predetermined algorithms.

Whitehead's Process Pluralism

Alfred North Whitehead's process philosophy complements Bergson's duration by providing a formal metaphysical framework for understanding reality as event-based rather than substance-based. Traditional substance ontology treats enduring objects such as atoms, organisms, and persons as metaphysical primitives that persist through time while undergoing accidental changes. Process philosophy inverts the view that events constitute the fundamental units of reality, with enduring objects emerging as patterns of related events rather than substrates underlying change. Each actual occasion "prehends" prior occasions, integrating their objective data through subjective aims, determining how the past actualizes in the present. This prehension is not a passive reception but an active appropriation. Each occasion selectively incorporates aspects of its past, contributing its own novelty to cosmic advance by synthesizing inherited data with a subjective purpose.

Linking process philosophy to cellular mechanisms illuminates how distributed intelligence operates without centralized control. Bacterial colonies responding to nutrient depletion do not possess homogeneous consciousness-deliberating strategies; instead, individual cells perceive chemical signals, integrate them with metabolic states, and actualize responses through bioelectric and genetic state changes. The colony exhibits collective intelligence through numerous actual occasions—each cell at every moment prehending its environment and contributing adaptive responses—without requiring coordinated planning or centralized command.

This panexperiential ontology, where mentality permeates matter at all scales, yet in diverse, non-monistic layers, further dissolves the complex problem of human consciousness, according to David J. Chalmers (1996). Why does subjective experience accompany neural processing? If prehension pervades reality wherever actual occasions integrate data and contribute novelty, then human consciousness represents a high-complexity instance rather than an inexplicable emergence from unconscious matter.

Contending Mechanism and Dialectics

Mechanistic reductionism treats organisms as complex chemical machines whose behaviors follow necessarily from molecular properties and physical laws. The explanatory successes of this framework, from the decoding of heredity in molecular genetics to the elucidation of metabolism in biochemistry and the revelation of protein functions in structural biology, indicate that living processes obey chemical laws without requiring special vital forces, apparently vindicating mechanism against vitalism. Oddly, the successes of these mechanisms concern how life operates at molecular scales, not why particular molecular configurations emerge or how novelty arises through evolution and development.

Take enzyme catalysis, for instance. The mechanism provides an excellent explanation of how enzymes accelerate reactions through transition-state stabilization (Schramm 1998), demonstrating that catalytic activity requires no vital forces beyond those of quantum chemistry and thermodynamics. Strangely, the mechanism struggles to explain which enzymes cells synthesize when, why particular metabolic pathways activate under stress, and how cells collectively solve novel problems through metabolic reconfiguration. These involve creative selection among alternatives that molecular properties permit but do not determine precisely the domain where teleodynamic intelligence operates.

Hegelian dialectics, as explored briefly in the section Pillar Six: Affirmative Vitalism (Metaphysics), presents a different challenge. Rather than reducing life to mechanism, dialectics treats change as driven by contradiction and negation. Thesis encounters antithesis; their opposition generates synthesis, both canceling and preserving them in transcended form. A dialectical view of evolution might interpret extinction-radiation cycles as thesis-antithesis conflicts in which old forms negate new forms, generating syntheses that incorporate both. It is not surprising that the dialectical framework systematically distorts creative advance by treating change as fundamentally conflictual and progressive toward closure.

Bergson's critique of Hegelian dialectics centers on its spatialization of duration into oppositional moments rather than on grasping the continuous, creative flow (Lawlor and Moulard Leonard 2024). In Bergson's view, contradiction does not drive change; instead, incompatibility among simultaneous possibilities forces a selection, with the selected actuality incorporating the past as a matter of mind rather than negating it. Extinctions do not operate through negation and sublation but through creative recycling and opportunity creation. Trilobites do not negate but decompose, liberating calcium and organic matter into biogeochemical cycles, where their descendants inherit body plans through evolutionary continuity rather than dialectical transcendence. This distinction proves crucial for understanding environmental dynamics and social change.

Concluding Remarks

This cell-based paradigm offers a competing, if not alternative, systemic framework for understanding reality, knowledge, and ethics grounded in cellular

foundations that span organizational levels, from the molecular to the cosmic. The seven pillars (self-organization, teleodynamic intelligence, bioelectric communication, scaling vitality, observer-participancy, affirmative vitalism, and humble humanism) together constitute an integrated framework that addresses perennial philosophical questions while generating practical guidance for navigating complex systems characterized by distributed intelligence, emergent properties, and creative advancement. Broadening Bateson's (1979) call for "a necessary unity" between mind and nature and Berry's (1999) insistence on reading the "book of nature," together, as the previous section illustrated, this cell-based paradigm opens up major research frontiers across disciplines, not just in biology, environmental science, and technology ethics but also in political economy, education, and beyond.

In conclusion, the cell-based paradigm culminates in an ethical stance combining affirmation with humility. Affirm human creativity and technological potential as genuine contributions to cosmic evolution; maintain humility about the limits of understanding and its embeddedness within systems whose full dynamics remain mysterious. This both/and position, i.e., creative participation plus humble acknowledgment, characterizes cellular philosophy's guidance for navigating unprecedented futures where choices made now shape trajectories extending far beyond our lifetimes, yet whose outcomes remain profoundly uncertain. It also opens avenues for exploring the complexity and unpredictability of systems arising from self-organizing mechanisms, such as stigmergy, that are beyond the creator's planning (if indeed there is one, as hinted by the fine-tuning theory).

Competing Interests

The author declares that they have no competing interests.

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The Mystical Experience of Evolution: Alfred Russel Wallace, Ernst Haeckel, and Pierre Teilhard de Chardin

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Evolution is frequently regarded as evidence of an atheistic–mechanistic worldview. Still, it implies that life, and thus also consciousness and knowledge, is a developmental phenomenon and inherently unfinished. Here, we define this condition as the mystical dimension of evolution and apply it to examine how three early evolutionary thinkers came to advocate a metaphysical view of evolution. Alfred Russel Wallace outlined an evolutionary cosmology centered on the emergence of human self-awareness. Ernst Haeckel advanced a monistic view of evolution in which matter and spirit are two sides of the same coin, and Pierre Teilhard de Chardin regarded consciousness as the unifying trajectory of an evolutionary process that encompasses the entire universe. The article then compares the mystical–evolutionary perspectives to contemporary evolutionary thought. Particular attention is given to the question of reality's inner aspect, the origin of consciousness, and the discussions surrounding the anthropic principle. We then address possible implications of evolutionary mysticism for deep ecology and environmentalism.



Introduction

Evolutionary thought took form during two developmental phases. The first gained prominence in the wake of the Enlightenment and German idealism, where naturalists began to conceive the history of life as manifestations of an inherent growth process. Erasmus Darwin (1794, 505) described biological novelties as caused by “the faculty of continuing to improve by its own inherent activity,” Jean-Baptiste Lamarck conceived of them as the result of an inner strive for perfection, and Alexander von Humboldt (1845, 52; our translation) described nature as an organic whole—a “Naturgemälde (painting of nature) . . . set in motion and enlivened by internal forces.” Naturalists from Peter Simon Pallas (1766) to Heinrich Bronn (1858) envisioned the history of life as an ever-branching tree of life across deep time (Hestmark 2000), according to Arthur Schopenhauer, empowered by some form of universal will. The botanist Franz Unger also described evolution as driven by intrinsic growth processes in which novel taxa emerged from forerunners, like a tree whose branches never stop dividing and growing. The “origin for all these manifold distinctions . . . can by no means be an external one but must of necessity lie within” (Unger 1852, 344; our translation).

The second phase began with Charles Darwin’s (1859) *On the Origin of Species*. The book greatly substantiated evolutionary thought with a wide range of empirical data. Still, Darwin’s most crucial contribution was, in tandem with Alfred Russel Wallace, to launch a mechanistic explanation that made it possible to imagine how one species transformed into a novel one. Darwin was less concerned with ideas of inherent growth, emphasizing instead causal relationships associated with descent in terms of struggle for life, adaptation, and natural selection. The concept of the tree of life, in fact, is only touched upon hastily in his book and explicitly assigned as a simile, without any inherent reality: “The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth” (Darwin [1859] 1909, 129–30). The advent of Darwinism accordingly heralded a concept of life where organisms were increasingly perceived as externalized secondary effects and ruled by heritable traits and environmental factors (Huneman 2014; Lindholm 2015).

Darwinism soon sparked debate. Pre-Darwinian thinkers had envisioned the tree of life as empowered from within—leaving space for metaphysical speculation. In contrast, evolution by natural selection seamlessly described how one species transformed into another, without remnants of any gods in the gaps. The aftermath of the publication of *The Origin of Species* was accordingly dominated by harsh confrontations between theists and atheists, and the controversies remain current in some circles (Scott 2004; Goodman 2010).

One might question, however, whether evolutionary thought itself contains a possible solution to the polarized discourse. Given that living beings are

evolving, human insights are provisional and evolving as well. Knowledge grows, just as life does, both historically and biographically. This fact facilitates an epistemology that does not regard scientific truth as final and finite but as evolving, as the horizon is constantly expanding (Archetti 2012; Whitehead 1932). Thinking and understanding are unfinished enterprises that proceed throughout life (Arendt 1971). Educational theories have frequently considered knowledge and concepts as growing units alongside child development (Lindholm 2018; Steiner [1924] 1995; Vygotsky 1962). In *Die Weltalter*, Friedrich Schelling ([1811] 1985) asserts that concepts develop and thus always tend to be incomplete, as “principles and concepts cannot be defined once and for all in any fixed way—for being caught up in continual motion, advancement, and intensification, any concept of it can hold true only for a fleeting moment” (quoted from Teichmann 1989, 23; our translation).

The dialectic habit of science may itself be understood as an expression of the rhythm or pulse of evolving knowledge (Sparby 2014), which lets us suggest that lasting insights as well as the temporariness of specific knowledge may coexist and coevolve. This is something most scientists are familiar with. Novelties may begin as fragile hunches but become substantiated in due time, branch out, and motivate new ideas, hypotheses, and research projects. Knowledge evolves. This does not mean that everything is relative. Old truths are rarely wrong. The theory of relativity did not ruin Newtonian physics. But there was more to the story. The theory of evolution is no less valid today than when it was conceived. Still, important features are complemented or appear in another light now than during the Victorian era. Too rigid positions, be they atheistic or theistic, may hinder the evolvability of knowledge, as both set limits to what we can know. Still, evolutionary epistemology may arouse metaphysical undertones, as research tends to penetrate ever deeper into its subject (Dreyfus and Kelly 2011).

Research is always conducted with the expectation that there is something more to discover. This implies that knowledge contains a tacit element (*sensu* Polanyi 1966). The capability of knowledge to grow and evolve (i.e., the growth of biological thought, *sensu* Mayr 1982) may legitimize the term “evolutionary mysticism.” Evolutionary mysticism in our context is hence not an esoteric or incomprehensible issue but rather the fact that knowledge has an inherent tendency to develop, transform, and expand (Lowney 2023). The term points to the experiential depth of insight that emerges when knowledge transcends purely analytical modes of thinking. In this article, we use the term “mysticism” to denote the evolving, transformative character of knowledge when it engages not only with facts but also with the meaning and interiority of reality.

This conception of mysticism aligns with Georg Friedrich Hegel’s (1991) distinction between understanding (*Verstand*) and reason (*Vernunft*). Understanding analyzes by breaking reality into discrete, classifiable parts.

Reason, by contrast, intuitively grasps the wholeness that underlies those parts—a unity that understanding finds mysterious, not because it is irrational but because it exceeds analytical thought. For Hegel (1991, 133), what appears mystical to the intellect is for reason graspable as a speculative unity:

“The mystical” is certainly something mysterious, but only for the understanding, and then only because abstract identity is the principle of the understanding. But when it is regarded as synonymous with the speculative, the mystical is the concrete unity of just those determinations that count as true for the understanding only in their separation and opposition . . . [T]he rational as such is rational precisely because it contains both of the opposites as ideal moments within itself. Thus, everything rational can equally be called “mystical”; but this only amounts to saying that it transcends the understanding. It does not at all imply that what is so spoken of must be considered inaccessible to thinking and incomprehensible.

Mysticism, then, is not irrationality but points to a state of knowledge that grows organically from the limitations of mere understanding. Against this backdrop, one may ask whether contemporary evolutionary thought, with its emphasis on causal mechanisms and natural selection, has lost sight of reason, perceived as a holistic evolutionary tree of life. The latter, by contrast, may offer a metaphysical yet experientially grounded understanding of evolution.

This article investigates how the mystical undertones found among pre-Darwinian thinkers transformed and reemerged in the decades following the advent of Darwinism. We examine how the inside dimension, the emergence of consciousness, and the human riddle took form among three evolutionary scientists: the British naturalist Alfred Russel Wallace, the German biologist Ernst Haeckel, and the French biologist-theologian Pierre Teilhard de Chardin, and how these problems revitalized mystical elements in their evolutionary understanding.

We then discuss the possible legitimacy of such interpretations in light of contemporary evolutionary biology and cosmology, again structured around three central motifs: (1) the tree of life as expression of an inside, (2) the evolutionary character of consciousness, and (3) the peculiar evolutionary position of *Homo sapiens*. To our knowledge, such a comparative approach has not previously been undertaken. Finally, we explore the possible relevance of evolutionary mysticism for deep ecology and environmentalism (Lindholm 2022; Taylor 2009).

Evolutionary Mysticism by Alfred Russel Wallace

In England, mystical elements of evolutionary thought are particularly associated with Alfred Russel Wallace (1823–1913). Wallace was not only Darwin’s

co-discoverer of the theory of evolution by natural selection but also the first to discuss the origin of *Homo sapiens* in the light of the new theory (Wallace 1864, 1870). He entered the topic without metaphysical aspirations, but his findings profoundly altered his view (Lyons 2019). Wallace claims that *Homo sapiens* cannot be fully explained by natural selection alone. Humans possess an amount of cultural adaptability, behavioral flexibility, and moral awareness that allows them to act with foresight and alter their evolutionary trajectory to an incomparable degree. Intellectual capacity and social flexibility prevent selection from taking hold, as cultural and mental attributes enable sufficient autonomy and foresight to get ahead of the selection mechanism. This marked, in his view, a turning point in the history of life on Earth: “A being had arisen who was no longer necessarily subject to change with the changing universe—a being who was in some degree superior to nature, inasmuch as he knew how to control and regulate her action, and could keep himself in harmony with her, not by a change in body, but by an advance of mind” (Wallace 1870, 325).

With the rise of tool use, situated collaboration, and symbolic thought, the selective pressures on the human body decreased, while the evolution of the brain and mind accelerated. In contrast to other species, which continue to adapt through physical change, Wallace argues, the human being evolves through cognitive, ethical, and technological means. Natural selection no longer dictates bodily evolution; instead, humanity is now shaped by foresight, intention, and cultural invention.

By evading natural selection, *Homo sapiens* constitutes an evolutionary shift with profound consequences for the entire planet. A creature that is foresighted and masters the forces that would otherwise lead to adaptation will increasingly reshape its environment in accordance with its own preferences. Humans may hence alter the fate of other species, too: “This victory which he has gained for himself, gives him a directing influence over other existences. Man has not only escaped ‘natural selection’ himself, but he is actually able to take away some of that power from nature which before his appearance she universally exercised. We can anticipate the time when the Earth will produce only cultivated plants and domestic animals; when man’s selection shall have supplanted ‘natural selection’” (Wallace 1870, 326). Wallace thus identified core elements of what is referred to as the Anthropocene.

The peculiar case of *Homo sapiens* in the tree of life caused Wallace to revise previous beliefs. He began to take interest in parapsychology, forged contacts with theosophical circles, and became concerned with the immortality of the soul. The evolution that has produced the diversity of life will gradually burn out, he asserted, and in future center around the ethical growth of humanity. *Homo sapiens* is evolutionarily unfinished. Ethics do not make life easier but rather more challenging, Wallace asserts. Humans must solve dilemmas that cannot easily be mastered, but the struggle for truth, beauty, and goodness

makes the individual wiser and promotes cultural and personal growth. Human beings accordingly constitute the crossroad where biological evolution turns into cultural and ethical evolution by means of fulfilling their destiny through ethical and spiritual growth (Wallace 1870, 351). *Homo sapiens* constitutes a turning point where the evolutionary trajectory, which had thus far pointed outwards and created biological novelties, turns inward towards increased ethicizing.

This growing emphasis on the mental and moral capacities of humans led Wallace to reconsider the nature of consciousness itself. He came to see consciousness not as a mere byproduct of brain activity but as something intrinsic to the structure of reality itself. To make his case clear, he explores the relationship between consciousness, decision-making, and bodily action (Wallace 1870, 351). Indeed, the latter requires energy, measurable as calorie consumption. The governance of action, however, is posed by conscious agency, which accordingly cannot be solely a matter of calories. Action depends on an initiative and a decision, which emanate from an impulse. It is the subject who stands up and decides where, how, and for how long the activity and energy consumption should last. This initiative and the concurrent control do not stem from muscles. The subject takes hold and maintains them until the task is accomplished. The regulatory determinant of energy consumption is therefore first-person agency and consciousness.

Wallace's colleagues, including Darwin and Thomas Huxley, still insisted that consciousness could be deduced from the cellular protoplasm of the brain. Wallace rejected that position, as it would mean that neural tissue, if only sufficiently complicated, suddenly brought to life an inexplicable subject. This sudden emergence of an inside with a first-person perspective would pose a "black box," as there is no principal difference between simple and complex nerve tissue. To conceive consciousness as merely a neurophysiological epiphenomenon, according to Wallace, leads to unsolvable logical problems. The only remaining answer is to conceive consciousness as a fundamental property not only of living things, but of matter per se (Wallace 1870, 359; 1889, 476). The experiential inside perspective is accordingly an inherent part of reality.

Admittedly, Wallace was not always consistent in his claims, but nonetheless repeatedly considered consciousness an inherent feature of reality, not a separate existence. In his autobiography, he complains that he once published a book entitled *The Scientific Aspect of the Supernatural*, as the last term is "somewhat misleading... For all the phenomena, however extraordinary, being really 'natural' and involving no alteration whatever in the ordinary laws of nature" (Wallace 1905, 280). Numerous scientific facts, from astronomy and microbiology to magnetism and electricity, would once have been considered supernatural, he writes. Reality is matter and spirit in one and the same. In this way, Wallace's

scientific reflections evolved into a holistic worldview, which also made him an early environmentalist pioneer (Knapp 2008; Lomolino 2019).

Wallace's (1889, 477) ideas gradually expanded into an evolutionary cosmology, where "the whole purpose, the only *raison d'être* of the world—with all its complexities of physical structure, with its grand geological progress, the slow evolution of the vegetable and animal kingdoms, and the ultimate appearance of man—was the development of the human spirit in association with the human body."

In the book *Man's Place in the Universe* (1904), he gathers further evidence to substantiate his view, citing features of the galaxy, the solar system, Earth's rotation, climate, atmospheric chemistry, and orbital stability as prerequisites for intelligent life. He returns to the theme in *The World of Life* (1911), where he once again concludes that the history of life constitutes a trajectory culminating in humanity. Wallace (1911) sees evolution first branching out into increasing diversity through "the production of the lower animals" before seeming to "converge in definite directions," culminating in the ethicizing animal *Homo sapiens*. This prospect comes close to what Pierre Teilhard de Chardin would advocate two generations later.

Thus, to Wallace (1911, 391), the potentiality coming to expression in the human being became the fulcrum that in its core was the driving cause for the universe, the Earth, and the biosphere: "[T]hese deeper and deeper mysteries which confront us everywhere as we advance farther in our knowledge of this universe, are now serving, and will serve in the future so long as man exists upon the Earth, to give him more and more adequate conceptions of the power, and perhaps to some extent of the nature, of the author of that universe; will furnish him with the materials for a religion founded on knowledge."

Wallace (1869, 596) envisions a future state of individual freedom and moral self-governance as the goal of cosmic evolution—achieved through the development of humanity's intellectual, ethical, and physical capacities: "[S]o perfectly fitted for a social existence, by knowing what is right, and at the same time feeling an irresistible impulse to do what we know to be right." Evolution, accordingly, was to Wallace not only a biological process but also a mystical experience—one that bridged empirical science with inner experience, not confined by the divide between nature and culture. As will be shown, Wallace was not alone in this way of thinking.

Evolution as Spirit and Matter: Ernst Haeckel

In German culture, spirit and matter as two sides of the same coin was advocated not only among naturalists but also among thinkers like Friedrich Schelling and Johann Wolfgang Goethe. This laid the foundation for Ernst Haeckel's monistic view of evolution. In line with his phenomenological disposition—a

legacy from Goethe¹—Haeckel (1866 Vol. II, 447; our translation) considers science and philosophy as two sides of the same coin: “All true natural science is philosophy, and all true philosophy is natural science.” He labels his worldview monism, to mark the conquest of the mind–matter dichotomy and described the universe as a unified substance that expresses itself both materially and spiritually. All matter, he claims, is spiritually animated, and every spiritual action corresponds to a physical form, and this became manifest in the imagination of evolution as a growing tree.

Haeckel’s contribution to the general acceptance of the theory of evolution is probably even more significant than that of Charles Darwin. Strikingly, however, Haeckel does not stress adaptive details and speciation. In fact, natural selection “played only a secondary role in Haeckel’s evolutionary philosophy” (Bowler 1989, 201). Instead, the tree of life, as a unifying imagination of the inside–outside, became a recurring motif in his evolutionary concept (Pietsch 2013). From this, Haeckel outlines an evolutionary cosmology where everything is derived as a continuation of the preceding—not along mechanistic principles and the causal nexus but organically, as trees grow and unfold in space-time. This led Haeckel to a narrative of evolutionary growth, without sharp boundaries between matter, life, and soul. “In Haeckel’s view, evolution is a universal phenomenon affecting everything from inorganic matter to man” (Levit and Hossfeld 2017, 176). In his book *Kristallseelen* (*Crystal Souls*), Haeckel (1917) even tries to integrate a spiritual aspect into the mineral kingdom. He delves into issues of biocrystallization and suggested that minerals have a kind of inside too, like living matter, as “everything that has materiality is also alive, whether it is organic or inorganic. Everything is animated, both crystals and organisms” (Haeckel 1917, 10; our translation).

Haeckel—more consistently than Wallace—views consciousness as an inherent property of matter, not a supernatural entity separate from the natural world. For Haeckel, evolution follows a progressive trajectory—an unfolding from simple to more complex forms, with the human being at its apex. Though he rejects teleology, the logic of his system implies inevitable movement toward “more perfect” structures (Levit and Hossfeld 2022, 15). Mystical undertones are also present in what Haeckel (1866, 300; our translation) considered his most famous discovery—that organisms embryonically repeat the evolutionary history of their ancestors by what he called organic creation: “The organic individual repeats during the rapid and brief course of its individual development the most important of those form transformations which its ancestors underwent during the slow and lengthy course of their paleontological development.”

To Haeckel, *Homo sapiens* is not as enigmatic as it is to Wallace. Nonetheless, he acknowledges that humans fundamentally differ in their relationships with the environment and thus pose an anomaly. Similar to Wallace, he identifies elements of what a century later would take form as the Anthropocene concept. With

humans, the history of the Earth enters “the era of man, the anthropolithic or anthropozoic period . . . Man has acted with a greater transforming, destructive, and modifying influence upon the animal and vegetable population of the Earth than any other organism. For this reason . . . we may with full justice designate the development of man and his civilization as the beginning of a special and last main division of the organic history of the Earth” (Haeckel 1868, 300–1; translated by Kutschera and Farmer 2020).

It may seem disputable whether Haeckel’s view of evolution qualifies as mystical. He himself would have rejected mysticism, as the monism he advocated became increasingly atheistically fashioned. Still, his approach comprises pseudo-religious undertones, in contemplating the tree of life as a manifestation of the living wholeness of evolution. Altogether, Haeckel drew more than two hundred trees, often presented as magnificent oaks with powerful stems, branches, and twigs, to visualize the history of certain taxa, or the entire world of life. He perceived the evolutionary tree the way clergy perceive their altarpiece—as a philosophical–scientific artwork that unveils the descent of life as an artistic drama throughout the history of the Earth.

From E-volution to In-volution: Pierre Teilhard de Chardin

In France, mystical responses to evolution were rare, but one prominent case is Pierre Teilhard de Chardin (1881–1955), who was both an ordained priest and a paleontologist (with a PhD on the evolution of mammals). He was inspired by Henri Bergson and went on to develop a Christian–evolutionary cosmology, as elaborated in his book *Le Phénomène Humain* (Teilhard de Chardin 1959). Teilhard considered God as part of the evolutionary theatre, through a form of theogenesis (Delio 2020). This section shows that Teilhard, similar to Haeckel, was primarily inspired by the imagination of the tree of life and less bothered by causal mechanisms of speciation.

Teilhard argues that reality cannot be fully grasped from an external, outside perspective alone. He sees this latter approach as an unintended consequence of striving for scientific objectivity. To counter it, he calls for a “within” perspective—a participatory, first-person form of cognition. Teilhard describes this within as a psychic depth—a quality present wherever consciousness emerges. He clarifies that it is not a physical depth (like geological layers) but the inner side of matter itself, a personalized face of the cosmos: “The *within* is used here . . . to denote the ‘psychic’ face of that portion of the stuff of the cosmos enclosed from the beginning of time within the narrow scope of the early Earth” (Teilhard 1959, 72).

Teilhard hence arrives at a view that has much in common with Wallace and Haeckel: consciousness is an inherent property of reality, manifesting itself as intentional, formative competences of matter. Teilhard does not consider the origin of life as a crucial problem but instead views life and the Earth’s

crust as intimately interwoven from the very beginning. Crystallized minerals have in common with life the competence to maintain form. Still, minerals cannot grow into organized, evolving wholes. In Teilhard's (1959, 69) words, the mineral kingdom embarked early on a path "which closed them prematurely in upon themselves." But the formation and crystallization of the Earth's crust also resulted in the release of energy, which in turn made life possible. From an inner perspective, the lithosphere sacrificed itself for the emergence of life. From an outer view, this aligns with geo-ecological processes like the weathering and erosion of the Earth's crust, which mobilize mineral nutrients by means of clay, silt, and sand and enable soil formation and plant growth. In this way, Teilhard's view closely aligns with the breakdown of the lithosphere into soil, which provides the physical foundation for the plant kingdom. In Teilhard's terms, the inner and the outer represent two sides of the same phenomenon: the dissolution of one principle makes possible the emergence of the next.

A core message throughout Teilhard's book is that development is not just about growth or novelty but follows a full arc—from emergence to maturation, followed by decline and dissolution. Goethe (1991) had considered this developmental cycle to be particularly distinct in herbaceous plants. Growth is initially rapid when a shoot and a stem with large leaves take form. But then growth ceases. New leaves are successively smaller and finally replaced by a novel principle, the flower, which in turn is short-lived but lays the foundation for seeds in the future.

Development is hence not only growth, extension, and e-volution but contraction and in-volution too, where something folds back and into itself, while simultaneously condensing into a new level. Teilhard (1959, 271) sees the history of life as pulses of unfolding e-volution, which transform into in-folding in-volution.

Self-awareness marks a crucial case of such in-volution, when consciousness folds back on itself. It is no longer just perception but the ability to reflect: to know that one knows. This creates a centered unity in the individual. This self-reflective in-folding gives rise to a new inner world. With it comes abstract thought, imagination, mathematics, art, and shared emotion. These are not merely by-products but the consciousness imploding into itself.

In-volution of consciousness, however, also encompasses a novel capacity for shared meaning. Consciousness understands; self-consciousness also recognizes that others understand. Humans grasp the meaning of the term "we," which denotes a common space for shared meaning and collective intentions. No individual on their own can construct skyscrapers, steer tankers, wage war, manage wealth, trade stocks, extract metals from the Earth's crust, or export goods across the globe. All such endeavors rest on the capacity to share meaning. The brain and self-consciousness function as shared mental organs, unifying humanity through common understanding (Dunbar 1998; Henrich

2016). Rudolf Steiner (1988, 125) points to this capacity in claiming that “[b]ecoming aware of the idea within reality is the true communion of humanity.”

Teilhard describes this sharing capacity as the emergence of a new mental envelope on Earth: the noosphere. Alongside the lithosphere, hydrosphere, atmosphere, and biosphere, the noosphere is a thinking layer that spreads across the planet with the rise of self-consciousness. With the advent of *Homo sapiens*, the Earth, he writes, “gets a new skin—or better, finds its soul” (Teilhard 1959, 183).

The noosphere marks the beginning of a novel ripening of a seed resulting from consciousness imploding into itself. It constitutes a turning point, where consciousness, which hitherto was animate and sensuous and directed outward, folds inward and becomes aware of itself.

With humanity, evolution itself begins to reflect. We are, according to Teilhard (1959, 224), “not the centre of the universe . . . but the arrow pointing toward its unification.” This echoes Wallace’s view as well as that of German Romantic thinkers like Schelling, who saw nature becoming conscious through the human mind. Teilhard (1959, 120) expresses it simply: “The consciousness of each of us is evolution looking at itself.”

The in-folding that occurred in the biosphere “when for the first time a living creature perceived itself in its own mirror” (Teilhard 1959, 181) marked the advent of a new evolutionary principle. Until then, evolution had been about proliferation of ever-novel forms. But from then on, diversification may transform into “in-volution,” characterized by gradual convergence and homogenization. This possibility, speculatively suggested by Teilhard, may sound unfamiliar to many, as speciation is commonly perceived as a branching process. However, in the meantime, it is recognized that novel species also may form through the hybridization of existing species (Abbott et al. 2013). It has also been speculated that such fusions may be on the rise due to human influence, associated with the homogenization of ecosystems (Vallejo-Martín and Hiscock 2016).

Teilhard (1959, 272) labels the ultimate goal of this growing convergence the Omega Point—an invisible magnetic pole that increasingly pulls evolutionary trajectories into similar directions, toward “that point at which, under the synthesizing action of personalizing union, the noosphere (furling its elements upon themselves as it too furls upon itself) will reach collectively its point of convergence.” Teilhard frames this evolutionary culmination in Christian terms. Christ becomes the face of the Omega Point—the ultimate convergence of consciousness. Just as biological evolution gave rise to self-awareness, Teilhard envisions a spiritual evolution culminating in Christ as the final center of unity. This vision comes close to Wallace’s view (“so perfectly fitted for a social existence”) as well as echoes other philosophical traditions that see love as the highest aim of human development. In Teilhard’s framework, evolution not only

manifests diversification and increased complexity but leads to communion, culminating in Christ as the final in-volution of the universe.

Discussion

Largely independently of each other, Wallace, Haeckel, and Teilhard developed evolutionary cosmologies with metaphysical elements that exhibit substantive thematic affinities:

1. They call for a complementary inside perspective.
2. They integrate consciousness into a broader evolutionary context.
3. They consider the human being a focal point in the evolution of the universe and the biosphere.

In the following, we elaborate how these lines of thought relate to contemporary understandings of cosmology and evolution before discussing the possible relevance of the elaborated perspectives for deep ecology and environmentalism.

The Inside Perspective

Strictly speaking, natural selection explains all organic features as caused by genetic recombination. Evolution in its Darwinian framing thus conveys an externalized view of life (Griffiths 2002). Darwin “created a perfectly externalist theory, a theory that seeks to explain organisms and their adaptations exclusively in terms of challenges and influences from their external environments” (Rosslenbroich 2023, 199). Teilhard (Teilhard 1959, 225) similarly critiques contemporary biology for rendering the organism passive—unable to influence its own development.

The loss of the inside perspective in the wake of Darwinism may be an unforeseen backfire of the disappearance of the tree of life from evolutionary thinking. Darwin’s use of the term “simile,” as quoted earlier, indeed encapsulates the core of the problem. By employing that word, he makes clear that the tree is merely a symbol, rooted in an external resemblance between two phenomena, without true kinship. A closer reading of Haeckel or Teilhard reveals that they do not perceive the tree of life as a simile for evolutionary history. Rather, they outline a genuine affinity: that the tree expresses something of the same formative force (*Gestaltungskraft*) they perceive within evolution itself. Darwin’s “simile” heralds a natural philosophy grounded in externalization, whereas the symbolic realism of the tree of life entails an implicit recognition that evolution possesses an interior—something that resists complete articulation in instrumental terms, a metaphorical resonance between two patterns whose likeness cannot be fully accounted for in words. This is why it is fitting to call Haeckel an evolutionary mystic, in contrast to Darwin, who, through his invocation of the simile, signals a worldview where nothing remains once concepts have been defined and

explained. For Darwin, concepts contain nothing beyond that which serves to explain them. Here, one recognizes from a different angle the distinction between understanding (*Verstand*) and reason (*Vernunft*) as articulated by Hegel.

The gene-centered and mechanistic view of evolution, however, that dominated biological thought during the twentieth century has gradually been extended and complemented (Baedke 2021; Devitt 2008). Organisms are not passive but active agents and co-constructors of their environment, through what is now defined as niche construction (Odling-Smee et al. 2003). Species reorganize their ecological niche and are hence to a certain degree in fact adapted to themselves (Pigliucci and Müller 2010; Uller and Laland 2019). Moreover, they alter the premises of selection by means of shifting developmental trajectories (Gilbert and Epel 2009) or by learning (Lindholm 2015), by phenotypical plasticity (West-Eberhard 2003), and by developing local traditions for nongenetic behavior (Jablonka and Lamb 2014), with unpredictable evolutionary outcomes.

Philosophical objections also took form, as a one-sided externalized view of life may threaten both humanity and the biosphere by generating what Hannah Arendt ([1963] 2007) considers “Earth-alienation.” We no longer see the Earth as our home and as qualitatively significant but as an accidental particle in an endless ocean of cosmic dust. A civilization that perceives reality only as an externality may become increasingly alienated from the Earth and threaten its natural surroundings.

In the sense that all three thinkers, from various positions, became proponents for an inside dimension of the biosphere, they reconnect evolutionary thought to pre-Darwinian thinkers, who conceived evolution as a growth process with inherent integrity, not merely an external effect of mechanistic factors. Thereby, they also settle close to metaphysics, however, as when claiming that human ethical development poses an extended continuation of organic evolution. In this way, inside and outside are brought together on a higher level, as Goethe advocated as the basis of his early evolutionary thought. He rejected the notion that one can distinguish inside from outside, writing in the poem “Allerdings” that nature is neither core nor surface but both at once (“*Natur hat weder Kern noch Schale/ Alles ist sie mit einem Male*”). Implicit is the idea that no boundaries are set for human knowledge: knowledge evolves and is henceforth latently mystical.

Albert Schweitzer arrived at a similar stance. To him, the immediate inside experience of being alive and wanting to continue living became the fundamental experience: “Philosophy must start from the most immediate and comprehensive fact of consciousness, which says: ‘I am life which wills to live, in the midst of life which wills to live’” (Schweitzer 1929, 246). The human experience of being alive and willing to live thus becomes the foundation for an ethical mysticism of nature: “Rational thinking which is free from assumptions ends therefore in mysticism. To relate oneself in the spirit of reverence for life

to the multiform manifestations of the will-to-live which together constitute the world is ethical mysticism” (Schweitzer 1929, XIV).

Schweitzer does not regard ethics as an additional construct but as something that emerges directly from the human experience of living itself. This makes *Homo sapiens* an evolutionary turning point: “What is the goal of this evolution which has begun in me?” (Schweitzer 1929, 249). Schweitzer finds himself in the same position as Wallace did two generations earlier. As an evolutionist, Schweitzer ascertains that there can be no definitive answer to this question. Just as evolution itself remains unfinished, the fundamental problem of humanity must remain unfinished. Yet it is precisely this character that leads him to a mystical view of life: “The surmisings and the longings of all deep religiousness are contained in the ethic of reverence for life. This religiousness, however, does not build up for itself a completed worldview, but resigns itself to the necessity of leaving its cathedral unfinished” (Schweitzer 1929, 250).

The Evolution of Consciousness

The claim that consciousness is an intrinsic property of the Earth, and possibly even of the universe, is commonly referred to as panpsychism (Goff 2023). Panpsychism is a prevalent worldview among Indigenous cultures (Abram 1997) but has also been advocated by philosophers from Baruch Spinoza to Alfred North Whitehead (Vetlesen 2019). This has also been related to the foundations of quantum mechanics and the geometry of space-time, suggesting a connection between the molecular processes of the brain and the underlying structure of the universe. Some theorists, like Stuart Hameroff and Roger Penrose (2014), tie neural quantum processes to consciousness, again claiming awareness as a fundamental aspect of the universe itself.

Indeed, *Homo sapiens* does not constitute the only species equipped with consciousness. Various forms of agency, awareness and proactive behavior have been documented across the animal kingdom (Bielecki et al. 2023; Lindholm 2015; Margulis 2001) and are even sometimes suggested to be a panbiotic capacity (Baluška and Levin 2016). Whether landscapes, rocks, and minerals also possess consciousness is challenging to clarify. However, the belief that mountains are dwellings of gods is widespread, and such ideas may also be found, for instance, among deep ecologists (Abram 1997; Foltz 1995).

The idea that evolution moves not only outward through diversification (e-volution) but also inward through integration and internalization (in-volution) was already present in early developmental thinking. Goethe, as mentioned, used the herbaceous plant’s life cycle as an archetype for alternating pulses of e-volution and in-volution (Portmann 1987). Contemporary evolutionary biologists sometimes arrive at similar conceptions. John Maynard Smith and Eörs Szathmáry (1995) identify a sequence of what they term “major evolutionary transitions,” where forms of increased complexity arise through

inverted cooperation and internalized consolidation. Prokaryotes became eukaryotes by means of symbiosis; eukaryotes formed multicellular organisms with specialized tissues, and multicellular organisms fused to superorganisms, as in ants and bees. A recent transition, they argue, occurred with the emergence of self-aware humans as outward-facing cognition folded inward, giving rise to language, empathy, and collaboration (Murphy, Ellis, and O'Connor 2009; Wilson 2015). Like Wallace, Szathmáry (2015, 10110) argues that self-awareness preempts natural selection and inhibits further biological change, causing a “gradual de-Darwinization of human biology.”

Simona Ginsburg and Eva Jablonka (2019), moreover, bring the transition perspective closer to consciousness. With memory and learning capacity as key parameters, they identify five stages of consciousness across the history of life, following a pattern comparable to the major evolutionary transitions, again culminating in *Homo sapiens* as the most complex case.

Cosmology and the Emergence of the Human Being

Conceiving of evolution as the gradual emergence and individuation of consciousness invites reflection on the relationship between the universe and the human being—a question that occupied all three evolutionary thinkers. The issue reappeared throughout the twentieth century among physicists, in what they began to term “the anthropic principle” (Barrow and Tipler 1986; Carter 1983).

Biology and astrophysics usually consider life and consciousness accidental byproducts of cosmic evolution. Rather than reversing causation, the anthropic principle highlights an observational selection effect: only universes compatible with the existence of life and consciousness can be observed. Slight changes in the frame parameters of quantum mechanics, chemical composition, or stellar properties would make life impossible, as noted by Fred Hoyle and Robert Dicke. Highly specific preconditions associated with the Earth–solar distance and the position of the solar system within the galaxy are also crucial for life (Gonzalez, Brownlee, and Ward 2001; Lammer et al. 2009). The implications are potentially far-reaching: the universe appears fine-tuned for the development of life and consciousness.

The anthropic principle led John Archibald Wheeler to the concept of the “participatory universe,” which has features in common with the works of Wallace, Haeckel, and Teilhard. Digging down into reality, deep down beyond particles, quantum mechanics, and quantum fields, Wheeler ([1989] 2018, 311) at the bottom finds meaning: “[E]very item of the physical world has at bottom—at a very deep bottom, in most instances—an immaterial source and explanation; . . . all things physical are information-theoretic in origin and this is a participatory universe.” He seeks support in Parmenides of Elea, who proposed that what is is identical with the thought that recognizes it, leading

Wheeler to the puzzling assumption that “the observer is as essential to the creation of the universe as the universe is to the creation of the observer” (quoted from Gale 1981, 171).

The emerging philosophy of physics, as advocated by Thomas Hertog (and, indirectly, Stephen Hawking), rejects the narrative of a universe as a machine ruled by pre-created laws. Instead, a conception of a self-organizing universe is advocated, where physical laws are not determinative but serve reality (Hertog 2023a, 258). The idea, Hertog (2023a, XIV) writes, gradually emerged through a puzzling feeling “as if the geneses of life and the cosmos are entwined with each other, that the cosmos knew all along that one day it would be our home.” This comes close to physicists like Freeman Dyson (1981, 250), who forty years earlier claimed that “[t]he more I examine the universe and study the details of its architecture, the more evidence I find that the universe in some sense must have known that we were coming.” Hertog’s book, through collaboration with Hawking, meets the call from Arendt to overcome the externalized Earth-alienation, as when Hertog (2023b, 41) states: “The quantum outlook that Stephen and I developed reads the universe’s history from within.”

Taken together, these perspectives suggest a possible convergence between cosmology, biology, and consciousness studies. What began as separate domains of inquiry increasingly points toward a participatory view of reality—one in which life and mind are not evolutionary accidents but intrinsic features of the unfolding universe.

Implications for Deep Ecology and Environmentalism

Mechanistic explanations and natural selection almost inevitably invoke externalist perspectives. The “inside” of evolution, in contrast, such as metaphorical visions like the tree of life, becomes accessible through a holistic approach (Hedlund 2024). Elements of such internal dimensions of life have been advocated even among biologists (Fábregas-Tejeda et al. 2024; Sterelny 2004). Efforts to reconcile nature’s outside and inside have long been an issue among environmentalists. Already, Henry David Thoreau (1817–62) conceived nature as a form of prayer (Higgins 2017), as did Rachel Carson (1907–64). Aldo Leopold began his deep-ecological journey of thought after an experience he had as a forester and wolf hunter after World War I. An encounter with a dying wolf sparked his environmental ethics. After the shot, he approached the wolf “in time to watch a fierce green fire dying in her eyes. I realized then, and have known ever since, that there was something new to me in those eyes—something known only to her and to the mountain” (Leopold 1949, 138). He had become aware of the inside of nature, and the event became the beginning of a lifelong commitment to environmental activism and eco-philosophy.

Eric Katz (1997) encourages us to conceive of nature as a subject with inherent integrity. Like humans, nature is both entitled to respect and subject to

traditional ethical categories. James Gibson (2009, 11), moreover, claims that we are approaching a scientific–cultural transformation, leading the externalized outside into a reenchanting experience of nature and reality, which constitutes a “reinvestment of nature with spirit. Flatly rejecting modernity’s reduction of animals, plants, places, and natural forces to either matter or utilitarian resource, the culture of enchantment attempts to make nature sacred once again.” Environmentalism accordingly reflects the emerging insight that some pioneers of evolution were approaching in their search for an inside of nature.

Wallace anticipated elements of the Anthropocene based on what he perceived as a fundamental evolutionary problem associated with the human being. The general reluctance among colleagues to acknowledge his perspective, however, contributed to the century-long delay of its general acceptance. Today, the Anthropocene is an undeniable reality, if only because the planetary consequences of human behavior can no longer be ignored.

By virtue of a willingness to share responsibility for the future of the planet, the environmental movement signals that it is fundamentally anthropocentric. By taking co-responsibility for the future of the Earth, humans implicitly herald that they regard themselves as co-stewards of creation, and the claim hence poses an indirect recognition of the anthropic principle. While all other species address their evolutionary existence within specific ecological niches, the human being is forced to relate to the entire planet. The Anthropocene unquestionably manifests the enigmatic relation between human beings and the planet they inhabit, hence confirming the potential actuality of the anthropic principle. This is the insight Arendt (1958, 2) captures when she writes that “the Earth is the very quintessence of the human condition.”

The dawn of the Anthropocene discloses a blind spot within mainstream biological thought—its failure to embrace the full complexity of the human riddle. Only recently have some researchers begun to confront the problem. Joseph Henrich (2016, 318) characterizes the human being as a fundamentally new existence of the biosphere, “a new kind of animal,” and Patrick Roberts and Brian A. Stewart (2018, 542) claim that the profound adaptive shift in the species–environment relationship necessitates “a new ecological definition of our species.” Such statements come close to Wallace’s (1864, clxviii) claims, who already in his first article on human evolution wrote: “Here, then, we see the true grandeur and dignity of man. On this view of his special attributes, we may admit that even those who claim for him a position as an order, a class, or a sub-kingdom by himself, have some reason on their side. He is, indeed, a being apart.”

In this way, Wallace’s scientific reflections evolved into a holistic worldview. Evolution became not just a biological process but a mystical insight—a bridge between empirical knowledge and inner experience, a vision of nature in which external reality and the human mind were no longer opposed but intertwined.

This insurmountable condition lends renewed legitimacy to the nature–mystical evolutionary philosophy that pre-Darwinian thinkers advocated at the dawn of evolutionary thought.

Conclusion

This article has explored the mystical dimensions of evolutionary thought as articulated by Alfred Russel Wallace, Ernst Haeckel, and Pierre Teilhard de Chardin. Despite differing contexts, all three emphasize an inner perspective, integrating consciousness into the evolutionary process, and situating humans as pivotal actors within the universe and the Earth. Wallace highlights *Homo sapiens* as a turning point, where cognitive, ethical, and cultural capacities guide evolution beyond natural selection. Haeckel's monism portrays evolution as an organic unfolding, uniting matter and spirit, while the tree of life symbolizes the biosphere's integrated wholeness of internal and external dimensions. Teilhard extends this vision, conceiving of evolution as alternating phases of outward diversification and inward reflection, culminating in the self-aware noosphere and the Omega Point.

Contemporary biology and cosmology echo these insights: niche construction, agency, and the evolutionary transitions toward complexity possibly reflect an emergent inside dimension, while panpsychist perspectives and participatory universe theories suggest consciousness may be intrinsic to reality. These views also inform environmental thought, framing humans as co-stewards of creation and underscoring the ethical and ecological responsibility inherent in the Anthropocene. Evolutionary mysticism thus bridges empirical knowledge and inner experience, offering a holistic understanding of life, consciousness, and the human role in shaping both Earth and cosmos.

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Note

- ¹ Haeckel had a drawing of Goethe contemplating over the skull of Friedrich Schiller on his *ex Libris*, with Goethes quote above: “Was kann der Mensch in Leben mehr gewinnen / als dass sich Gott-Natur ihm offenbare” (“What more can man gain in life / than that God-nature reveals itself to him”).

Competing Interests

The authors declare that they have no competing interests.

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Life's Complex Specified Information Is a Kind of Value

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In this article, we argue that complex specified information (CSI) is an important feature of life and a kind of value that all life instantiates. In support of our first thesis, we demonstrate that life's CSI operates at three interacting levels: cosmic fine-tuning for a life-supportive environment; genetic and epigenetic information within biological life; and the capacity of intelligent life to detect and create CSI. In support of our second thesis—that life's CSI is a type of value—we demonstrate that life's CSI shares traits (normativity, rarity, and gradedness) in common with the three classical values: epistemic, moral, and aesthetic. We suggest a value theory (axiology) research program guided by the hypothesis that value itself is best understood as (primarily) normative rarity. We show how this approach to axiology can be guided by perspectives derived from the integration of cosmology, biology, and information theory.



Justin Garson (2019, 1) observes that biological “functions are folded into philosophical debates about biological information.” In this article, we draw from scholarship on biological function to make progress in the philosophy of information and value theory. Our complex specified information (CSI) account of life’s informational foundation, including its functional component, will illuminate the nature and classification of values, so as to enrich value theory as a branch of philosophy.

Philosophers of biology overwhelmingly support “function talk in biology . . . and the normative connotations of this vocabulary” (García-Valdecasas and Deacon 2024, 21). So, for example, the function of the heart is to pump blood. When a heart’s blood-pumping capability is significantly reduced by disease, it is scientifically and medically respectable to say that the heart is *mal*functioning—deviating *badly* from a norm. The widespread support for this normative aspect of biological function persists despite continuing disagreement over exactly how to define biological function.

The organizational account of biological function¹—a younger rival to the selected effects account and the causal role account—seemed the best theory to account for the normativity of biological function. However, Luca Corti argues that the organizational account falls short of fully accomplishing this. Among the supplements that might improve the organizational account of life-functional normativity, Corti (2023, 20) recommends trying to “explicitly associate the notion of biological organization with the notion of value.” Corti’s call for a value analysis of function echoes earlier well-known acknowledgements that “function can’t be understood in a purely naturalistic/value-free way” (to quote one of our blind reviewers).² This article does this by arguing that life’s organizing CSI, which includes a normative (conditions of correctness) functional aspect, *is* a kind of value. In so doing, we offer a deeper explanation of the normativity of biological function. Our project emulates a recent trend of pluralist engagement with multiple theories of biological function.³ Although we offer a basic understanding of “function” (that is not limited to biological function) to develop our core thesis, we also selectively adopt insights from several theories of biological function to further articulate our account of life’s CSI.

Introduction to Complex Specified Information

Information is increasingly attracting the attention of scientists and philosophers (Floridi 2016). CSI is an account of information that deserves more attention than it has received because, unlike other meanings of information (e.g., Shannon information and Kolmogorov information), CSI contributes to a unified understanding of life’s functions—cosmic fine-tuning for the possibility of life, biological life, and intelligent life. Although Shannon, Kolmogorov, and other concepts of information relate to CSI in various illuminating ways (as we will discuss), none of them constitute a fundamental kind of value (we unpack

value here primarily as normative rarity) comparable to the three classical values (epistemic, moral, and aesthetic), as is the case with life's CSI.

We define CSI as a probabilistically complex (improbable) arrangement of entities that satisfies independently given specifications (tight constraints), such that it has function (i.e., function due to the joint occurrence of probabilistic complexity and tight constraints).⁴ "Tight constraints" specify a tiny region of possible entity configurations—the ones consistent with functional requirements—within the vast space of comparable conceivable possibilities. At many places in this article, we address multiple accounts of function, especially biological function. Our CSI definition focuses on function in the general sense of tightly structured capability within a probabilistically complex system,⁵ as illustrated and explained by examples to follow. This paragraph you are reading is a probabilistically complex arrangement of symbols (mainly alphabetic characters) that satisfies independently given specifications (including those of logic and grammar), such that it has a communicative function—a tightly structured capability (Hazen et al. 2007, 8576). Therefore, this paragraph is an instance of CSI (we call it "textual CSI"). Its communicative function is to define and exemplify CSI.

CSI is used here in an evaluative and axiological sense, not as a hypothesis about causal mechanisms. Accordingly, this article makes no claims about agency or origins and offers no critique of evolutionary mechanisms; its focus is exclusively on the normative and value-theoretic significance of life-functional information.

The term "complexity" in our CSI definition is used in the probabilistic sense standard in Fisherian analyses of stochastic processes: it measures the difficulty a stochastic process faces in generating a target configuration. This notion of complexity evaluates the adequacy of candidate mechanisms. It is importantly different from algorithmic or Kolmogorov complexity, which measures compressibility relative to a universal Turing machine. Algorithmic complexity evaluates description length not probability of formation via stochastic processes and is therefore complementary to—but not a replacement for—the probabilistic complexity central to CSI.⁶

The kind of rarity analyzed in this article is a consequence of the tight constraints consistent with functional requirements.⁷ The previous paragraph's particular communicative function is a rare capability because it is generated by adherence to tight constraints so as to distinguish it from (i) possible arrangements of alphabetic letters that communicate *different messages*, and (ii) the vastly larger number of ways to assemble gibberish so as to communicate *no meaningful messages*. Throughout this article, we mainly refer to rarity in reference to comparable conceivable possibilities (i.e., the space of possibilities) not actual frequencies in the world. Meaningful sequences of alphabetic characters are extremely rare in the space of possibilities, even though they are not rare in actual frequencies (due to Earth's billions of people).

An airplane embodies CSI because it is a technologically functional complex arrangement of parts that satisfies the independently given specifications (tight constraints) of ways to be an airborne transportation machine. The tight constraints of airplane CSI specify a tiny region of possible mechanical part configurations—the ones consistent with functional flying requirements. Such functional requirements specify a tiny region in possibility space by virtue of the conjunction of the physical laws of our cosmos (e.g., gravity), the nature of our planet's atmosphere, and many other factors. These constraining factors are independent of any specific airplane construction efforts exerted by any technologically capable species of life. These specifications (tight constraints) are independently given by a particular planetary–cosmic context. Such is the character of technological CSI.

Biological CSI makes possible the maintenance and reproduction of an organism (see the section “Biological CSI: Information that Guides the Maintenance and Reproduction of Life”). An organism embodies CSI because an organism perpetuates its own existence by means of hierarchically coordinated systems and subsystems, each of which is a biologically functional complex arrangement of parts that satisfies the independently given specifications (tight constraints) of ways to contribute to the state of being alive.⁸ The tight constraints of biological life's CSI specify a tiny region of possible part configurations—the ones consistent with biological life's functional requirements. Such functional requirements specify a tiny region of possibility space by virtue of the conjunction of physical laws (e.g., laws governing molecules), the traits of a local life-friendly environment, and other factors treated in the first two subsections of the section “CSI Is a Central Feature of Life.” These constraining factors are independent of (and temporally/explanatorily prior to) any specific events that produce biological organisms. These specifications (tight constraints) are independently given by a particular planetary–cosmic context.

Although technological and biological CSI exhibit qualitatively different kinds of function, they both share the common traits of CSI: probabilistic complexity and tightly constrained functional specificity. Textual CSI, described earlier, likewise exhibits these traits. Life's CSI—including biological, technological, and textual CSI—always possess function: transportive, reproductive, sensory, metabolic, communicative, logical, poetic, etc.

The functional component of life's CSI requires more explanation. In the case of textual CSI, consider a paragraph as a unit of discourse that expresses an idea by means of a sequence of alphabetic letters. What a unit of discourse does (a conceptual–communicative function) is inherent to what a unit of discourse is (a conceptual–communicative entity). This analysis helps support our thesis that function is a necessary aspect of life's CSI.

We can extend this argument to biology. A gene also contains sequence information: a sequence of bases within DNA—adenine, cytosine, guanine,

and thymine. Francis Crick (1958, 144) pioneered the recognition of such sequence information: “By information I mean the specification of the amino acid sequence of the protein.” DNA is unzipped to use this information: the sequence information of a gene codes for a corresponding sequence of amino acids that fold into a protein. This means that a gene is an instance of biological CSI because it is a probabilistically complex sequential arrangement of bases that satisfies the independently given specifications (tight constraints) of ways to code for a functional protein, such that it helps support life. The capability of a gene to help generate a functional protein is itself a function of that gene. So, function is an essential aspect of both the gene’s CSI and the corresponding protein’s CSI. Such biological CSI analysis—in conjunction with the earlier parallel technological and textual CSI analyses—cumulatively supports our thesis that function is inherent to all of life’s CSI.

Partial degradation of life’s CSI, such as heart disease, can result in various degrees of dysfunction (malfunction), but such dysfunction is quite different than a CSI-exhibiting entity never having had any function at all—completely functionless in life’s history. We amplify our CSI analysis of biological information and biological function in the sections “Biological CSI: Information that Guides the Maintenance and Reproduction of Life” and “The Rarity of Value: A Consequence of Small Selection within Vast Possibility Space.”

We should further explain the complexity of CSI. The complexity (C) of CSI is probabilistic (not descriptive or Kolmogorov)⁹ complexity. The greater the probabilistic complexity (e.g., the more possible number sequences to potentially open a lock), the smaller the probability of that object or event (e.g., unlocking a lock by arbitrarily attempted combinations). Accordingly, our definition of CSI indicates that probabilistic complexity amounts to improbability. Probabilistic complexity on its own does not constitute CSI. An instance of CSI also requires specification.

A specification in CSI designates certain outcomes in possibility space. For example, ponder the specified card combination called a royal flush. A royal flush earns a high score in a card game because it is tightly constrained by card trait parameters, which makes it special. Such tight specifications render the resulting card hand a rare occurrence in the game. Rarity is one of the traits of value, as we argue in the section “The Rarity of Value: A Consequence of Small Selection within Vast Possibility Space.” This supports our thesis that life’s CSI is a kind of value.

Our account of CSI unpacks the most common pre-theoretical use of the word “information.” Such ordinary language use amounts to the kind of information that undergirds functions (tightly structured capabilities within a probabilistically complex system). This sort of information does not correspond to Shannon information, Kolmogorov information, or several other theoretical accounts of information beyond CSI. People ordinarily recognize such

information by its function: data enables a computer to display a book and an assembly line robot to help make an automobile. What such information does (function) is inherent to what that information is.

The remainder of this article focuses on establishing how cosmic fine-tuning for life, biological life, and intelligent life all have functions (characterized as tightly structured capabilities within a probabilistically complex system). Such functions exist in virtue of possessing both probabilistic complexity and a match to a tightly constrained, independently given set of specifications. This account of life's CSI function in the general sense also well accounts for some basic features of biological function, especially its normativity (conditions of correctness), as shown in the sections "Biological CSI: Information that Guides the Maintenance and Reproduction of Life" and "The Normativity of Value: Proper Function."

CSI Is a Central Feature of Life

To help recognize life's CSI as a kind of value, we demonstrate that CSI is one of the central features of life at multiple interacting levels, beginning with cosmic fine-tuning for life.

Cosmological CSI: Fine-Tuned for Life

The laws, constants, and initial conditions of the cosmos conform to a special set of requirements (specifications) that make life possible in our universe. Of the indefinite number of mathematical forms physical laws might take, those in a life-permitting cosmos must have certain forms. Such laws include a long-range attractive force like gravity that drops off with distance so that stars and planets can form, a very short-range strong nuclear force to bind protons and neutrons together stably in each atomic nucleus, and an electromagnetic force that drops off with distance to hold electrons in orbit around each atomic nucleus and transmit light energy from a host star to its planets.

The constants that calibrate natural laws, such as the gravitational constant that determines the strength of gravity and the initial conditions of the universe, are also coordinated to permit life. Some aspects of the fine-tuning of gravity are relative to yet other physical parameters. For example, gravity is fine-tuned relative to the initial condition of the density of matter in the early universe and factors controlling the Big Bang's expansion rate. "Holding these other parameters constant," Robin Collins (2009) explains, "if the strength of gravity were smaller or larger by an estimated one part in 10^{60} of its current value, the universe would have either exploded too quickly for galaxies and stars to form, or collapsed back on itself too quickly" to support life.¹⁰ "The lesson here," says Collins (2009, sec. 2.3.2), "is that a single parameter, such as gravity, participates in several different fine-tunings relative to other parameters." Many scientists accept that the universe is fine-tuned for life in the way Collins summarizes. Making this point, Luke Barnes (2012, 7) cites work by an impressively wide range of cosmologists. "They differ, of course, on what conclusion we should draw from this fact," Barnes notes.

An early study of cosmic fine-tuning, launched by Harvard biochemist Lawrence Henderson, argued that the peculiar properties of water and carbon dioxide—and the underlying laws governing carbon, hydrogen, and oxygen—are well suited for the only kind of life that appeared to him physically feasible, namely, carbon-based life. Henderson (1913, 312) concluded that “the biologist may now rightly regard the universe in its very essence as biocentric.” By this he primarily meant that the chemistry of the cosmos is functionally aimed at the support of life. As a pioneer of biochemistry and its use in biology, he identified a collectively improbable (probabilistically complex) arrangement of coordinated chemical regularities that satisfies the independently given specifications (tight constraints) of life-permitting chemistry. This constituted the preliminary development of the idea of cosmic CSI. Even if, contrary to Henderson (and many astrobiologists today), alternatives to carbon-based life are plausible, this does not undermine Richard Dawkins’s (1986, 9) point: “[H]owever many ways there may be of being alive, it is certain that there are vastly more ways of being dead, or rather not alive.” In the section “The Rarity of Value: A Consequence of Small Selection within Vast Possibility Space,” we explore this rarity feature of life’s CSI as evidence of its status as informational value.

Earlier we defined CSI as a probabilistically complex (improbable) arrangement of entities that satisfies independently given specifications (tight constraints), such that it has function. In this definition, “function” was used in the general sense of tightly structured capability within a probabilistically complex system. The fine-tuning of our cosmos, which constitutes CSI, renders it functional because it has the tightly constrained capability of supporting the possibility of life. These tight constraints render our fine-tuned-for-life cosmos rare in relation to other possible universes, the vast majority of which are incompatible with life.

It is important to emphasize that the complexity relevant to cosmological CSI lies not in the algorithmic length of the laws themselves, which may be quite short, but in the extraordinarily small region of the space of possible laws, constant-values, and initial conditions that jointly satisfy the independently specified functional requirement of permitting complex life. Even an algorithmically simple law—like Newton’s or Coulomb’s inverse square laws—could be one point in a possibility space whose life-permitting region is vanishingly small. The probabilistic complexity of cosmological fine-tuning therefore concerns the scarcity of life-consistent parameter combinations, not the compressibility of physical equations.

Even so, one way to connect CSI with algorithmic information theory (AIT) is to let AIT contribute to the recognition of a legitimate specification rather than characterize complexity. In many cases, the simplicity and non-gerrymandered character of a specification can be better recognized when it can be given a short description within the relevant mathematical or physical language (e.g., “life-permitting cosmos” in the case of cosmological fine-tuning).

Such descriptions are algorithmically compressible even when the underlying microstate or parameter combination is highly complex. CSI can combine this AIT-bolstered treatment of specification with probabilistic complexity, assessing how difficult it is for stochastic processes to land within the life-permitting region defined by that specification. On this view, AIT (in many cases) can help explain how we recognize a non-ad hoc specification, while probabilistic CSI quantifies how hard it is to realize that tightly constrained specification by stochastic processes.

For the “cosmic fine-tuning as CSI” argument to succeed, one need not formulate it as a rigorous statistical inference. Similarly, the rock art at Altamira, Spain (depicting bison, etc.) clearly instantiates CSI, even though the probability of getting these images on rock by chance is not known with statistical rigor. However, in a step toward statistical rigor in fine-tuning argumentation, Jeffrey Koperski (2005) and Collins (2009) have proposed solutions to the normalizability problem that might have otherwise undermined demonstrating the improbability (complexity) of universal fine-tuned features. Barnes (2018) offers a Bayesian way to answer the normalizability objection. Regardless of how this debate in probability theory plays out, local fine-tuned features (our next topic) are immune to such universal fine-tuned worries. So, in many cases, cosmic fine-tuning for life is demonstrably probabilistically complex (improbable)—thus sufficiently establishing the “C” of CSI in such cases.

Cosmic fine-tuning, which includes the features reviewed here, exhibits CSI because the laws, constants, and initial conditions of the cosmos collectively constitute an improbable (probabilistically complex) arrangement of coordinated factors that satisfies the independently given specifications (tight constraints) of how to make a life-permitting cosmos¹¹ and has function in the sense of a tightly constrained capability: the capability of supporting life.

For a treatment of “functional information” suggestive of the functional status of cosmic fine-tuning, see Robert Hazen et al. (2007, 8574–75): “All complex systems alter their environments in one or more ways, which we refer to as functions.” They analyze the information that makes certain functions possible in alphabetic letter sequences, RNA aptamers (RNA structures that bind a target molecule), and the Avida computer program aimed at simulating evolving life forms. Their account of functional information is aimed at explaining complex emergent systems, in all of which “interactions among numerous components or ‘agents’ produce patterns or behaviors not obtainable by individual components” (Hazen et al. 2007, 8574). Such systems exist at “every scale of the physical universe,” which should reasonably include cosmic fine-tuning for life.

In addition to universal fine-tuning, local conditions must also meet certain requirements if a place is to be life-permitting. Since Guillermo Gonzalez, Donald Brownlee, and Peter Ward (2001) introduced the “galactic habitable zone” (GHZ), studies have largely confirmed this restricted life-friendly

zone within a galaxy. Many astronomy textbooks now discuss the GHZ and acknowledge that a planet too near or too distant from a galaxy's center would be uninhabitable owing to multiple factors.

The circumstellar habitable zone (CHZ), as defined since the 1950s, is a narrow ring around a host star where liquid water is sustainable on a planet's surface. The prerequisites for planet habitability are numerous, and the list is growing: "The traditional definition of the CHZ, based on the radiant energy from the host star, is outdated and should be replaced with a definition that also includes such considerations as planetary impact rate, orbital dynamical stability and episodic reductions in the size of the astrosphere . . . Habitability factors are often interconnected in a complex web, and some factors can have multiple distinct effects on the habitability of a planetary system" (Gonzalez 2014, 56).

Local habitability requirements (especially for complex life) include having a planet of the right size and composition (appropriately orbiting the right kind of host star), the right kind of atmosphere, a global magnetic field, plate tectonics, a large appropriately distant moon, proper spatial relations to neighboring (and at times migrating) giant planets (like Jupiter), and much more.¹² Habitable environmental rarity is further increased by the many well-timed events (e.g., planet migration) that are preconditions for obtaining and maintaining many of the items listed here. Such local fine-tuned features collectively constitute a probabilistically complex (improbable) arrangement of entities that satisfies the independently given specifications of how to make and sustain a local habitable environment (within a given universe that has life-permitting physical–chemical laws).

Biological Complex Specified Information: Information that Guides the Maintenance and Reproduction of Life

Our characterization of CSI as a central feature of biological life, the point we will now support, is not an attempt to define life. Attempts at defining biological life have proved useful in certain fields, but there is no consensus on a definition. To proceed as a discipline, origin of life studies have had to grapple with what "life" minimally is. Fittingly, the notion of biological CSI made an early, but incompletely developed, appearance in that field.

Leslie Orgel expressed what origin-of-life researchers (like himself) would need to explain—namely, the origin of biological specified complexity. He noted that, in contrast to most nonliving things,

living organisms are distinguished by their specified complexity. Crystals are usually taken as the prototypes of simple, well-specified structures, because they consist of a very large number of identical molecules packed together in a uniform way. Lumps of granite or random mixtures of polymers are examples of structures which are complex but not specified. Crystals such as granite fail to qualify as living because they lack complexity; mixtures of random polymers fail to qualify because they lack specificity. (Orgel 1973, 189)

Orgel thought the “idea of information” could make “more precise” this joint occurrence of complexity and specificity in organisms. He stressed how “sequence information” in DNA “can serve to distinguish the contents of living cells from random mixtures of organic polymers” (Orgel 1973, 190–91).

Bernd Rosslenbroich (2016, 290) notes that “information processes are essential in all life functions.” He concludes: “Basically all structures of the organism must contain embodied information, whether it comes from the genotype or not.” In support of one of our major theses, biophysicist Bernd Küppers (like Rosslenbroich) concludes that information is the central unifying feature of life: “The fact that all phenomena of life are based upon information and communication is indeed the principal characteristic of living matter. Without the perpetual exchange of information at all levels of organization, no functional order in the living organism could be sustained. The processes of life would implode into a jumble of chaos if they were not perpetually stabilized by information and communication” (Küppers 2010, 170).

There is a range of opinion about the status of biological information, as Peter Godfrey-Smith (2007, 104) observes:

Some have hailed the employment of informational concepts here as a crucial advance . . . Others have seen almost every biological application of informational concepts as a serious error, one that distorts our understanding and contributes to lingering genetic determinism . . . Most of the possible options between these extreme views have also been defended. These include various arguments that some, though not all, of the popular uses of informational concepts in biology are legitimate.

Godfrey-Smith also notes (2007, 106): “The more contentious question then becomes whether or not biology needs another, richer concept of information as well as Shannon’s concept. Information in this richer sense is sometimes called ‘semantic’ or ‘intentional’ information.” He gives reasons to accept this richer sense of information in certain domains of biology. CSI accounts for this richer sense of information.

Similarly, John Maynard Smith (2000, 215) argues: “It does seem that there are today, in the living world, only two systems capable of unlimited heredity, that is, of transmitting an indefinitely large number of different messages: these are the genetic system based on nucleic acids, and human language.” Both of these systems involve symbolic sequence signals that contingently (not by necessity, as Smith emphasized) produce the targeted consequences of those transmitted signals. Smith notes that epigenetic mechanisms also play an important developmental role, for example, the “positional information” provided by the head–tail orientated gradient of the bicoid protein in a *Drosophila* egg.

More epigenetic types of biological information have recently surfaced. Some “systems approaches” to biology have emphasized the ubiquitous operation of “different regulatory levels such as genetic, epigenetic, and posttranscriptional gene regulation” (Rajewsky et al. 2018, vi). Such bioinformatic discoveries include many forms of “positional information.” For example, the three-dimensional organization of the genome within the cell nucleus “has an essential role in controlling genome function during normal growth, cellular differentiation, and stress response, showing that, overall, 3D reorganisation is tightly linked to changes in gene expression” (Fahmi, Sewitz, and Lipkow 2018, 1).

Philosophical reflection on systems biology has renewed efforts to understand what life is. Central to this ontological project is the systems biology study of “gene regulatory networks, rather than static DNA sequences as ‘codes,’” which “entails a different epistemology and ontology focused on the dynamic [informational] regulation of biological systems” (Green 2017, 5). Scholars also debate “whether systems biology explanations are mechanistic or not” (Green 2017, 5). This is understandable partly because systems biology increasingly relies on concepts like noise, filters, and amplifiers—which are derived from information theory and engineering (further supporting our CSI analysis of life).

Many biosemiotic practitioners have emphasized the importance of information theory to make sense of biological function. Wim Beekman and Henk Jochemsen (2023, 446) argue: “Biological regularity in protein biosynthesis appears dependent on *normative symbolic information processing*.” They think such biological information processing includes DNA as a carrier of “biological meaningful information.” Such biological information is “meaningful in the sense it delivers (eventually after some post-translational modification) a functional protein to a living cell. DNA contains functional information precisely in the context of the system of the living cell” (Beekman and Jochemsen 2023, 448). This approach contains some of the main features of our CSI account of biological information: CSI’s functionality (instructions for tightly structured capability within a probabilistically complex system) and normativity (maintaining conditions for correctness within an organism).

Cultural Complex Specified Information: Signs of Intelligent Life

Recall Smith’s (2000) reference to the “two systems” (human language and the genetic–epigenetic system) capable of “transmitting an indefinitely large number of different messages.” Intelligent life is capable of generating CSI, which we call cultural CSI. Language plays a prominent role in the conception, instantiation, and transmission of cultural entities. Technological CSI includes robotic programs that direct automobile assembly. The owner’s manual (textual CSI) for an automobile includes a specifications section that documents the right sort of oil and other fluids one should use.

Such cultural artifacts embody CSI. We noted earlier how an airplane embodies CSI because it is a technologically functional complex arrangement of parts that satisfies the independently given specifications (tight constraints) of ways to be an airborne transportation machine. So, cultural CSI includes the prominent subcategories of technological CSI and textual CSI. All forms of cultural CSI share (with cosmic fine-tuned CSI and biological CSI) the common traits of probabilistic complexity and tightly constrained functional specificity.

Altogether: Life's Complex Specified Information Operates at Three Interacting Levels

Life's CSI, we have demonstrated, resides at three interacting levels: cosmic fine-tuning for a life-supportive environment, genetic–epigenetic information within organismic life, and the capacity of intelligent life to detect and create CSI. At the middle of these three tiers, biological life itself is only possible if it resides within and properly interacts with a fine-tuned environment. At the top tier of life, intelligent life, CSI figures into the picture in a yet additional unifying manner. Culture, in at least the case of humanity, includes impressive achievements in creative literature, technology, and science—all of which involve CSI. So, we have demonstrated that all three levels of life's CSI interact with each other in ways that support an integrated theoretical framework for understanding life and its cosmic preconditions.

The relationship between the notions we have been employing can now be stated succinctly. AIT measures descriptive compressibility; Shannon theory measures uncertainty; CSI measures functional organization under probabilistic constraints. Because cosmological fine-tuning, biological regulation, and cultural artifacts all involve tightly specified functional requirements that must be met despite vast spaces of alternative possibilities, probabilistic complexity is their appropriate evaluative metric. CSI therefore captures the cross-domain unifying structure linking cosmological, biological, and cultural information.

Now we are ready to argue that life's CSI is a kind of value, which is a new theory of significance for the foundations of value theory and for how to account for key aspects of biological function.

Why Life-Functional Complex Specified Information Is a Kind of Value: Normativity, Rarity, and Gradedness

Philosophers traditionally have recognized three major kinds of value: epistemic, moral, and aesthetic (Tappolet and Rossi 2016). Normativity (conditions of correctness), or “oughtness,” is the most studied characteristic of these kinds of value. “Epistemic ought” means that a person should form and retain beliefs that are justified (e.g., avoid logical fallacies that violate conditions of correct reasoning), which in turn gives the person the best opportunity to arrive at truth. “Moral ought” means that persons should be (and do) good rather than

evil (ethically correct rather than ethically wrong). “Aesthetic ought” means that a person should appropriately recognize, enjoy, cultivate, and embody beauty. Although aesthetic value is more difficult to precisely characterize in comparison to the previous two classical values, we seem to often recognize it clearly.

People generally have strong intuitions supportive of this trilogy of assertions. Indeed, most people admire those who exhibit these values. The world ought to contain such virtuous persons, so the intuition goes. Disagreement over how exactly to understand these three kinds of value and their normative dimension leaves the intuition of this threefold normativity undefeated for most people. We propose a fourth major kind of value, life-functional informational value (understood as life’s CSI), which shares the common trait of normativity (and more) with the three classical values.

One might mistakenly think CSI has value only because biological life possesses it. Our account reverses this order of explanation. Biological life is valuable (or partly so) because it instantiates CSI—an intrinsically normative structure consisting of tightly constrained functional organization that defines proper functioning. CSI is therefore not a proxy for biological life’s value; it is the ground (or the partial ground) of that value. This distinction clarifies why CSI belongs alongside the classical values rather than merely being completely parasitic on them.¹³

The Normativity of Value: Proper Function

The value trait of normativity means that entities ought to function properly (satisfy conditions of correctness). Persons ought to function in a proper manner epistemically, morally, and aesthetically. We rehearsed this in the previous two paragraphs. An account of normativity as proper function across the three classical values helps us identify life’s CSI as a kind of value because life’s CSI too exhibits this trait characterized in this way.

Normativity as Proper Function

Does our universe, which many argue has been “selected” from a multiverse or from possibility space (Vidal 2010), have proper functions (preeminently, its capability to support life)? Several selectionist accounts of proper function pioneered by philosophers of biology and philosophers of technology (Krohs and Kroes 2009) motivate an affirmative answer. Some organizational accounts of ecological function also support our treatment of cosmic CSI. For example, Nei Nunes-Neto et al. (2014, 123) define “function in ecology as a precise effect of a given constraint on the ecosystem flow of matter and energy performed by a given item of biodiversity, within a closure of constraints.” Ecological function exists on a higher level than function within individual organisms. Consequently, an ecological approach to biological function exhibits some traits that have much in common with the highest level (scale) of analysis

in the natural sciences, which is in cosmology. Cosmological functions that contribute to life-permitting capabilities operate within an ascending hierarchy of subsystems contained within yet higher systems. The three levels of life's CSI (cosmic, biological, and intelligent) all properly function in the most robust sense when all three are in place and interact in the manner we have described.

Erik Weber and his colleagues offer an analysis of technological and biological function that supports our thesis. They explain the “epistemic value of biological and technical (advantage) function ascriptions in terms of the idea that their underlying structure provides the means to answer what-would-happen-if questions” (Weber et al. 2019, 560). In one biological function case study, the white underparts of seagulls were hypothesized to have the functional advantage of rendering the seagulls inconspicuous to their aquatic prey against a bright sky. After being artificially dyed black underneath, seagulls were shown to be less able to capture prey, thus answering a what-would-happen-if question. This what-would-happen-if investigative approach regarding biological function also helps make sense of cosmic fine-tuning for life as CSI. This is so because what-would-happen-if analysis shows that there are vastly more ways for a cosmos to be life-prohibiting (nonfunctional with regard to the possibility of life) rather than possess life-permitting functions. Although cosmologists have much less interventionist control (for the purpose of what-would-happen-if analysis) over their subject matter than biologists (e.g., artificially blackening the bellies of seagulls), a similar functional advantage analysis is useful.

To better grasp life-functional CSI's normativity, let us ponder the widely held intuition that things ought to function properly as specified by their own internal (especially informational) parameters for what counts as flourishing. We take it that when organismal parts or artifacts function properly, they function in a particular way. The proper function of the heart is to pump blood. The proper function of a watch is to tell time.

Wayne Christensen (2012, 104–6), while aiming to naturalize functional normativity in biology, notes the “deeper and thornier issues” associated with locating the “basic source of normativity.” In contemplating the “proper function of a heart,” he notes that some have supposed that it has “to do what ancestor hearts did that made them the target of selection” (this is a “selected effects” account of function; Christensen 2012, 105). However, “identifying this putative proper function will not allow us to conclude that this heart now ought to do what it's [sic] ancestor hearts did, or that it is bad if it does not” (Christensen 2012, 105). Christensen (2012, 104–6) proposes an alternative way to naturalize normativity that is roughly equivalent to the organizational account of biological function, which we partially appropriated earlier: “Here I present an account that identifies a basic form of valuational normativity in autonomous systems.” Some systems (e.g., living organisms) have “a very special relationship between their organization and their existence because (unlike rocks) they actively construct the conditions which give them unity and

ongoing persistence” (Christensen 2012, 104–6). He explains further: “A system is autonomous if it tends to generate the conditions for its persistence, and if it has infrastructure that contributes to this self-maintenance. Infrastructure here refers to persistent, relatively stable structure that shapes more dynamic system-maintaining processes, with the cell membrane of living cells being a paradigm example.” (Christensen 2012, 106).

Biological Proper Function Rooted in Genetic and Epigenetic Complex Specified Information

Our argument for the normativity of life-functional CSI is supported by recent discussion of biological information. For example, Nicholas Shea (2011, 183; emphasis added) notes that Kim Sterelny and Maynard Smith (see section the “Biological CSI: Information that Guides the Maintenance and Reproduction of Life”) “were the first to argue that genetic information should be understood in terms of teleofunctions, leading to a sense in which genes carry semantic information, with *conditions of correctness* or satisfaction.” This research supports our thesis that life-functional CSI in biology is characterized by normativity (conditions of correctness). Teleofunctions are the natural functional goals of organismal parts, which are coded for by biological information. This information-mediated process enables the perpetuation of life by particular functional means, such as limbs for walking. Environmental factors (e.g., toxins) can frustrate reaching such natural functional goals. In response to critiques of this view of biological information, Shea (2011, 187) argues that DNA carries “semantic information about something other than its own sequence properties” and that “there really are consumers of the message carried by DNA.” He concludes that there is a strong case for the “existence of substantive genetic information” (he similarly recognizes epigenetic information; Shea 2011, 189). Indeed, biological information is about producing teleofunctions (proper functions) that might or might not be correctly satisfied. This supports the case for the normativity of life-functional CSI.

The normativity (conditions of correctness) of biological information is also supported by numerous error-dampening and error-correction capabilities within organisms. The genetic code has built-in features that mitigate the effects of errors. For example, if a single DNA base pair is accidentally lost within an open reading frame section of DNA that is supposed to code for a protein, a minus-one frame shift error (mutation) occurs that would (without error-dampening capability) cause the cell to produce many copies of a broken or toxic protein. Fortunately, the DNA code system has three stop codons (TGA, TAA, and TAG) that often are triggered by such minus-one frame shift errors, enabling the cell to resist making harmful or resource-wasting broken proteins. David J. D’Onofrio et al. (2012, 9) have identified this error-dampening genetic logic as a “grammatical rule” that produces “halt commands” if a frame-shift mutation (FSM) occurs. They further note: “Less obvious is the fact that

potential stop codons present during a FSM, are not seen in genes that exhibit no frame shift mutations. They are inconspicuous within the normal context of gene expression and yet become viable during erroneous FSM expressions without prematurely terminating non FSM codonic regions. This shows that the genetic code, in part, is constructed to lessen the impact of frameshift errors due to the strategic use of grammatical rules” (D’Onofrio et al. 2012, 9).

Such error-correction procedures are part of the cell’s information-processing system at multiple junctures, including the repair of DNA replication errors, and fixing transcription and translation errors as DNA’s code is used to arrange amino acids into proteins. These facts about the self-regulating and self-perpetuating character of the information-processing systems of living organisms suggests an intrinsic oughtness to life and its underlying CSI.

Sune Holm’s philosophy of disease recognizes the normativity of life’s functions regardless of the events that led to their origin. He explains disease in terms of an organizational account of function according to which “the function of organismic parts and processes is conferred on them by their current role in the self-maintaining organization of the organism. I suggest that the dysfunction requirement [for defining disease] should be stated in terms of the organizational account of normative function in order for it to provide an adequate characterization of the problem cases discussed” (Holm 2014, 330).

He approvingly points to how “proponents of the organizational approach begin by pointing out that it is by virtue of being self-maintaining systems that organisms realize ‘the relevant causal regime in which the teleological and normative dimensions of functions can be adequately naturalized’” (Holm, 2014, 338). Our pluralist posture toward biological function allows us to appropriate insights from multiple perspectives on biological function, which collectively support the normative dimension of biological function. This trajectory helps establish biological CSI as a kind of value (normative rarity).

Similar to Holm, Jason Winning (2020) offers an account of proper function and natural norms in biology. He does so by analyzing performance-monitoring and censoring mechanisms at the subcellular level. For example, when sensor proteins detect too many malfunctioning (unfolded or misfolded) proteins, signals are sent to the cell nucleus to mitigate this error, such as by the production of more chaperone molecules that assist in proper protein folding. Such error-detection signals might also prevent the cell from undergoing cell division to prevent further proliferation of such malfunction. In severe cases, error-detection signals can trigger the release of enzymes called caspases that cause particular cells to self-terminate. Winning (2020, 16) concludes:

These examples have several features in common. In each case, there is some situation indicative of performance which is either registered as present or not present . . . triggering an unequivocal all-or-nothing type of response . . . In

other words, the recognition and typing of a performance token, an implicit if-then mapping from this recognized performance type to a categorical censuring response, and the context-dependent execution of that response, all the ingredients needed . . . to realize norms of performance based on censorious acceptance and rejection. Since what is being categorized is the performance of some subsystem or component, each of these processes can ground a distinction between functioning and malfunctioning for that subsystem/component.

He further argues that such subsystem informational normativity processes “can collectively realize a higher-level, and more complex, standard of functioning—not due to the fact that the higher-level censuring is causally dependent on the low-level censuring, but because it is *constituted* by it” (Winning 2020, 17). On this basis, he argues for an internal organismic perspectivalism that constitutes a “fully naturalistic, mind-independent grounding of proper function and natural norms” (Winning 2020, 1). So, “what counts as the proper function of a biological subsystem or trait is a matter of the perspective that the biological system, itself, has on what counts as proper functioning for that subsystem” (Winning 2020, 19). This nonconscious perspectivalism, though in need of more justification and articulation, constitutes a kind of biological normativity that is deeper than mere instrumental means—ends coherence.

José Pérez-Escobar (2024, 26–27) has developed a descriptive logical account of such teleological “proper function” reasoning that undergirds much of biological science. His “minimal logical teleology” makes sense of the commonalities and epistemic bridges between the study of biology and human artifacts, while also noting their main difference: “[A]rtifacts and biological phenomena feature extrinsic and intrinsic purposiveness respectively” (Pérez-Escobar 2024, 27). Nevertheless, these two domains of study share the same basic teleological explanatory structure: “The logical structure features an item that yields consequences, which are in turn evaluated relative to a purpose” (Pérez-Escobar 2024, 26). This teleological logic helps make sense of the internal organismic maintenance of proper function. Winning analyzes (e.g., sensor proteins that detect misfolded proteins and send signals to mitigate this deviation from normality). A teleological explanation recognizes that a “purpose” makes sense of an item so as to create expectations of that item: “It should exist, it should have certain characteristics, it is normatively charged inasmuch as it should ‘work’ in a certain way or else it is dysfunctional” (Pérez-Escobar 2024, 27).

Pérez-Escobar shows the utility of his minimal logical teleological account by demonstrating how it makes sense of the discovery of a directionality or “compass” system that helps many organisms navigate back to their nest location (and more). “The remarkable observation that the firing activity of some neurons correlate with an animal’s angular facing direction promoted a compass analogy

and the belief that these cells provide a cognitive representation of angular direction” (Pérez-Escobar 2024, 33). Teleology guided the discovery of this and other components of various biological GPS systems in the animal kingdom. The biological–artifact comparison did its work by means of a minimal notion of teleology regarding organismic function. Pérez-Escobar’s analysis of this operation in scientific practice does not require commitment to any particular theory of biological function. His case study of the discovery of “compass” systems in animals illustrates how, regardless of how one conceptualizes biological function, “ascribing a role/function/purpose . . . to biological phenomena is typical in” biological research (Pérez-Escobar 2024, 33).

This article uses Pérez-Escobar’s minimalist operational approach to find some common ground among competing accounts of biological function. We use these common insights to argue for normativity in biological function, which, in turn, supports our thesis that life’s CSI is a kind of value (normative rarity).

Is Informational Normativity More Fundamental Than Other Kinds of Normativity?

There is evidence that life-functional informational normativity is more fundamental than moral, epistemic, and aesthetic normativity. This section further supports our argument that life’s CSI is an important kind of value. We begin with moral normativity.

Life-functional informational normativity sometimes is explanatorily prior to moral norms. Gluttony violates the CSI functional normativity inherent to healthy living. Overeating and the resultant litany of weight-related illnesses partially inhibit humans from functioning properly. The specifications for proper function possess an informational oughtness that produces health problems when violated. Informational normativity means that human bodies possess particular features (made possible by CSI) that suit them for certain functions and not for others. Improper use leads to partial dysfunction—degradation of some of the CSI embedded in this anatomy and physiology. Here we see how informational normativity provides some of the foundation for moral normativity within human behavior with respect to diet. Examples could be multiplied with respect to exercise, sleep, substance abuse, and more.

Moreover, a similar connection holds *mutatis mutandis* between informational normativity and epistemic and aesthetic normativity. For example, scientific realists argue that in the case of our most theoretically virtuous (evidentially accurate, fruitful, etc.) scientific ideas, the core statements of such theories approximately grab hold of reality. Note that such core theoretical statements, which carry epistemic value, constitute textual CSI—scientific literature constructed from natural human language and special scientific–mathematical symbols. This is one sense in which informational value is more fundamental

than epistemic value. This line of reasoning suggests that informational value is more fundamental than the classical values in certain respects. That is, even if the values of rationality, goodness, and beauty are fundamental with respect to their own domain, they are not absolutely fundamental, at least in some respects. They are grounded (to some extent) in something else—namely, life's informational value.

Life-functional informational normativity is sometimes explanatorily prior to aesthetic norms. Environmental pollution often violates the CSI functional normativity inherent to healthy ecosystems. The aesthetic value of these environments is thereby degraded. In the absence of pollution, biological CSI more thoroughly guides the flourishing of flora and fauna, with the resulting instantiation of more aesthetic ecosystem properties. The aesthetic traits of the literary arts, such as novels and poems, supervene on the textual CSI of which they are composed. Although artistic license allows for some departure from the constraints of more ordinary language use (customary vocabulary, grammar, etc.), a pervasive or complete breakdown of such conditions of correctness results in gibberish—not literary art.

We again recognize the fundamentality of informational value when considering the nature of communication and the transference of values from one to another. Many people of diverse worldviews think that properly functioning persons will exhibit the three classical values (that is, be informed by rationality, morality, and aesthetic sensibility) and communicate such value (that is, inform or transmit form) to others. Informational–communicative transactions among persons and among organisms/things in the world may themselves exhibit one or more of the three classical values in varying degrees. For example, Shakespeare's *King Lear* is more aesthetically valuable than the gibberish of the town fool, Plato's *Republic* contains more epistemic value than the rants of the hoi polloi, and kind words exhibit moral goodness in a way that harsh words do not. Persons inform one another (communicate) intentionally in ways that involve all three classical values.

Notice how we use informational terminology (e.g., “inform” and “transmit form” and “communicate”) to help illuminate the three classical values. This suggests that at least in some respects, informational value is more fundamental than the three classical values.

Some recent efforts to understand normativity in a “liberal naturalism” manner resonate with our thesis.¹⁴ Consider, for example, Evan Fales's (2012) case for naturalistic moral realism. He attempts to ground all ethical normativity in natural teleologically ordered systems (paradigmatically in living organisms) in a way that resembles our case for informational normativity. While we argue that informational normativity is sometimes explanatorily prior to moral normativity, Fales attempts a complete reduction of moral normativity to informational normativity (without calling it such).

The Rarity of Value: A Consequence of Small Selection within Vast Possibility Space

Rarity is another common trait that life's CSI shares with epistemic, moral, and aesthetic value. We argue that there are few ways to be reasonable, moral, beautiful, and alive—that is, in comparison to the many more ways to be unreasonable, evil, ugly, and dead (lacking sufficient life-functional CSI).

Rarity was staring us in the face in our earlier exploration of cosmic fine-tuning for life as well as the genetic and epigenetic information that makes possible the maintenance and reproduction of organisms. Remember that if the strength of gravity were smaller or larger by an estimated one part in 10^{60} of its current value, the universe would have either quickly collapsed back on itself or expanded too rapidly for stars to form. In either case, such a cosmos could contain no life. Even within our fine-tuned cosmos, local conditions must meet many additional criteria to be habitable.

The extreme rarity of cosmological fine-tuning is echoed in molecular biology. Douglas Axe's (2004) experimental work implies that "the overall prevalence of [amino acid] sequences performing a specific function by any domain-sized fold may be as low as 1 in 10^{77} , adding to the body of evidence that functional folds require highly extraordinary sequences." A fold within a particular protein is an independent structural unit of that protein. Other studies have reinforced Axe's conclusion.¹⁵ These studies collectively demonstrate empirically that the percentage of life-friendly amino acid sequences (ones that make useful proteins) out of the total possible sequences is extremely rare. Recall Dawkins's (1986, 9) way of expressing this: "[H]owever many ways there may be of being alive, it is certain that there are vastly more ways of being dead, or rather not alive."

Epistemic value also exhibits the trait of rarity. Given that there are many possibly ways for beliefs or our belief-forming mechanisms to go wrong, knowledge is rare when compared to all the possible ways a person could hold unwarranted beliefs. Analysis of theoretical virtues also points to the rarity of epistemic value. Theoretical virtues are the traits of a theory that show it warrants acceptance. Such virtues include evidential accuracy, explanatory depth, and fruitfulness (Keas 2018). Although the characterization and epistemic status of the theoretical virtues are contested, many scholars affirm that these virtues help us infer which rival theory is the best explanation. Studies of prominent theories, especially in the natural sciences, have helped us recognize just how rare virtuous theories are compared to the vast number of possible ideas that would (rightly) be judged theoretically less virtuous (e.g., theories that are evidentially inaccurate, explanatorily shallow, fruitless, and ad hoc).

Similar considerations hold for aesthetic and moral value. Beauty requires a kind of harmony and order (among musical notes, words on a page, or pastels on a canvas) that is rare compared to the vast number of possibilities for

disharmony and disunity. This point holds even if, as many have argued, our universe contains much beauty. With respect to possibility space, such beauty is rare and unexpected. The frequency of beauty (or any other classical value) in the actual world is not at the heart of our argument. Rather, we have focused on rarity as a consequence of tight constraint gauged in reference to comparable conceivable possibilities (i.e., the space of possibilities), not actual frequencies in the world.

For example, consider some of the aesthetic traits of a good story. A good story will exhibit beautiful traits such as wittiness, irony, simplicity, and unity. There are many more ways to write stories that score low (rather than high) in such aesthetic traits. The last two aesthetic qualities deserve special attention in this regard. Simplicity refers to a story that is not more complicated than what is needed to fully develop the plot. There are far more ways to gratuitously complicate a story than to tell a story with graceful simplicity. How about the trait of unity (or unification)? A story will exhibit a pleasing unity if it illuminates very different kinds of human experience by showing how these experiential components belong to a larger whole. There are many more ways for a story to exhibit disunity rather than unity. It takes more effort and more artistic skill to craft a story with high degrees of these aesthetic properties.

There is a similar principle of moral rarity. Highly exemplary moral people are rare, and it is for this reason that we honor and seek to emulate such persons. Part of the reason for the rarity of highly moral people is that for any given highly prized moral act in a certain circumstance, there are a vast number of ways to act that would fall short of the moral ideal. For example, consider the highly prized moral action of assisting a stranger in a way that best matches the stranger's short-range and long-range needs, and that does so within the domain of the helper's capabilities at that time (with due consideration for appropriately maintaining financial resources for helping other people in the future, etc.). There are a vast number of ways to act in this situation that would fall short (to one degree or another) of the moral ideal. For example, you could do less than what you are capable of doing, or you could act without the appropriate amount of effort to become acquainted with the precise nature of the stranger's needs, and so on. The moral ideal occupies a tiny region within the space of such possibilities for action and motivation in that situation.

Let us probe deeper into the motivational reasons for the rarity of highly moral acts. Even in cases where someone acts publicly in an ostensibly moral manner, research shows that very frequently, the motivation for such acts is selfish (or a mixture of selfish and unselfish motives). For example, "the most investigated form of moral hypocrisy is *pragmatic* hypocrisy in which people fake moral commitment for their own advantage" (Lindenberg et al. 2018, 393). Furthermore, there is "a different form of hypocrisy in which people

take a moral stance with regard to norms they endorse without thereby also expressing a commitment to act morally. Rather they do it in order to feel good” (Lindenberg et al., 2018, 393). This is hedonic moral hypocrisy. The rarity principle of morality is widely acknowledged among scholars.

The Gradedness of Value: Weighing Worth on a Scale

Philosophers have long recognized that value comes in degrees, including different grades of epistemic, moral, and aesthetic value. On the epistemic scale of value, persons form beliefs with varying degrees of justification (some beliefs are more rational to hold than others) and hold beliefs with varying degrees of confidence or credence. On the moral scale of value, persons embody different levels of goodness (and evil), and various actions can be more or less praiseworthy or blameworthy. On the aesthetic scale of value, persons, things, and events embody or instantiate various degrees of beauty, from aesthetic excellence (e.g., sublimity and sophisticated elegance) to mundane aesthetic goodness (e.g., cuteness and neatness). For example, a very low degree of neatness might be barely above the threshold of junky clutter. Regarding epistemic, moral, and aesthetic value, it is difficult to precisely quantify degrees of value, although we generally think our comparative value judgments reliable.

By contrast, life’s CSI is not only graded but is often more readily quantifiable. The amount of CSI present in a given case sometimes can be determined by a precise calculation. For example, the amount of information encoded in DNA can be measured in bits.

Conclusion

CSI is a probabilistically complex (improbable) arrangement of entities that satisfies independently given specifications (tight constraints), such that it has function (i.e., function due to the joint occurrence of probabilistic complexity and specification). CSI, including its functional component, stands out as rare and special as a consequence of being tightly constrained. These narrow constraints distinguish any instance of CSI from the vast number of comparable conceivable possibilities—configurations that lack tightly structured complex system capability (“function” in the most general sense). Life’s CSI entails function (so defined) that operates within intelligent life, biological life, and their cosmic preconditions. The fine-tuning of our cosmos, which constitutes cosmological CSI, means that our cosmos is functional in the sense that it has the very interesting and tightly constrained capability of supporting biological life and intelligent life.

Biological CSI is functional in a sense that is more nuanced than the function of cosmic CSI. There is still much work to be done to potentially settle how to thoroughly account for biological function. However, despite this longstanding inconclusive debate, philosophers of biology overwhelmingly recognize the

legitimacy of function talk in biology, and the normative connotations of this vocabulary. Biological CSI, with its functional component, makes deep sense of biological function, especially when such CSI is understood as a kind of value—characterized preeminently as normative rarity. We especially support this conclusion by arguing for—not merely assuming—the normativity of biological function. CSI is an intrinsically normative informational structure that makes an organism possible. CSI is the bearer of functional normativity (proper function), the locus of the constraint-guided functions that collectively distinguish organisms from nonliving material objects. CSI is therefore not a proxy for biological life's value; it is the ground (or the partial ground) of that value. This distinction clarifies why CSI belongs alongside the classical values rather than merely being completely parasitic on them.

We explored how CSI is one of the most important unifying features of life. The support for this thesis consisted of demonstrating how life's CSI resides at three interacting levels: cosmic fine-tuning for a life supportive environment, genetic-epigenetic information that makes possible the maintenance and reproduction of organisms, and the capacity of intelligent life to detect and create CSI—including textual and technological CSI.

We then argued that this three-tiered life-functional CSI is a kind of value because, along with the three classical values (epistemic, moral, and aesthetic), it shares the properties of normativity (oughtness or proper function), rarity (a consequence of being a tightly constrained subset of comparable conceivable possibilities), and gradedness. We allocated the most space for demonstrating the normativity of life's CSI. That is our strongest argument for the conclusion that life-functional CSI is a kind of value.

Our article's principal contribution is this: we have demonstrated how CSI is a distinct kind of value characterized by normative rarity. Secondary or supportive corollaries include: CSI unifies the cosmological, biological, and cultural domains of functional information; CSI grounds functional normativity; and CSI is explanatorily prior (in limited respects) to the classical values—epistemic, moral and aesthetic.

Our CSI account of information, including its normative functional component, illuminates the nature and classification of values, which enriches axiology (value theory) as a branch of philosophy. This exploration of some of the surprising relationships between “is” and “ought” highlights ways in which axiology is entangled with philosophy's other major branches: metaphysics and epistemology.

While classical axiology has focused on normativity and gradedness, the common value trait of rarity has received less attention. We argue (memorably) that there are few ways to be reasonable, moral, beautiful, and alive but many ways to be unreasonable, evil, ugly, and dead (lacking sufficient life-functional CSI). Our study of life-functional informational value (CSI) might help others

better explain the property of rarity in epistemic, moral, and aesthetic value. We offer this insight as part of a research program in axiology, which also might provoke a better articulation of other kinds of value beyond the ones discussed in this article. Central to this suggested axiological research program is the hypothesis that value itself is best understood as (primarily) normative rarity (rare oughtness among conceivable possibilities). We have demonstrated how this approach to axiology can be guided by perspectives derived from the integration of cosmology, biology, and information theory.

Similarly, we encourage the investigation of further ways in which life's CSI is a more fundamental kind of value than the three classical values—epistemic, moral, and aesthetic. This approach has already strengthened our thesis that CSI is a type of value. Axiology might become more fruitful by the discovery of yet additional ways to integratively study the classical values with the assistance of a proper functional CSI account of life. Moreover, conclusions regarding CSI as a kind of value will have wide-ranging implications for long-standing debates in metaphysics, philosophy of mind, philosophy of nature, and philosophy of technology. Clarifying the nature and role of informational value, given its centrality to life and current renewed interest in information in our technological age, is of particularly relevant and timely interest. Regardless, there are many good reasons to now conclude that life's CSI is a kind of value.

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Competing Interests

The authors declare that they have no competing interests.

Notes

- ¹ Matteo Mossio, Cristian Saborido, and Alvaro Moreno (2009, 813) define “biological functions as causal relations subject to closure in living systems, interpreted as the most typical example of organizationally closed and differentiated self-maintaining systems. We argue that this account . . . provides an explanation for the existence of the function bearer and, at the same time, identifies in a non-arbitrary way the norms that functions are supposed to obey.”
- ² Although it is debatable whether such earlier studies of function imply a repudiation of naturalism (as possibly implied by the reviewer), we thank this reviewer for directing us to the following value-analytic approaches to function, which support our thesis: Peter McLaughlin (2000), Parisa Moosavi (2019), and Mark Bedau (1992). McLaughlin (2000, 5) notes that “[a]s it stands, the assertion that natural functions are either metaphorical or divine is simply one particular variant of an antinaturalistic credo and is *prima facie* no less metaphysical than a commitment to intrinsic value in nature.” Moosavi uses an organizational account of biological function to “argue that the flourishing-based concept of function that forms the basis of the neo-Aristotelian account of natural goodness is explanatorily indispensable to biology, and therefore essential to the understanding of living things” (quotation of the essay’s abstract), and she approvingly cites how “Bedau (1992) and McLaughlin (2001) have defended a *value-based* approach to understanding functions” (Moosavi 2019, 10). She also argues that “the explanatory role of organizational function ascriptions in biology can support the neo-Aristotelian concept of function, without implying that biology can give us a substantive account of moral virtue” (Moosavi 2019, 2). Finally, Moosavi (2019, 17) concludes that “organizational function ascriptions presuppose a notion of doing well for the organism that accords with the neo-Aristotelian concept of flourishing and flourishing-based evaluation. Thus, there is an evaluation of living things based on their characteristic flourishing that has the same conceptual structure as evaluations of human beings, including evaluations of human action and character.” These value-based approaches to understanding function indirectly support (or suggestively resonate with) our thesis that CSI (including its functional component) is a kind of value.
- ³ Samuel Cusimano and Beckett Sterner (2019, 2) note that in the past few decades, “philosophers of biology shifted away from attempts to provide universal necessary and sufficient conditions and moved toward a pluralist view that recognizes two major senses of function: an etiological account based on a trait’s history of natural selection, and a causal role account based on how parts of a system contribute to a system-level capacity of interest.” We follow this trend.
- ⁴ Leslie Orgel (1973) helped pioneer CSI (see the section “Biological CSI: Information that Guides the Maintenance and Reproduction of Life”) in ways that anticipated some of our account, but he was confused regarding certain elements of CSI. William A. Dembski (1998) provides a better account of CSI, which we have adapted. However, Dembski’s account differs from ours in that it does not deem function to be inherent to CSI. Unlike Dembski, we think specificity is determined by functional requirements. We intend specification to be a matter of mind-independent constraints, grounded in modal facts concerning global possibility space (metaphysical possibility and necessity) and local possibility space (nomological possibility and necessity), depending on the instance of

CSI in view. We are neutral in this article on how modal facts about possibility and necessity are best understood, whether in terms of (abstract or concrete) possible worlds or in terms of powers.

- ⁵ Our analysis of function is similar to that of Michael L. Wong et al. (2023, 5): “Insofar as processes have causal efficacy over the internal state of a system or its external environment, they can be referred to as functions.” They argue: “Functional information quantifies the state of a system that can adopt numerous different configurations in terms of the information necessary to achieve a specified ‘degree of function,’ where ‘function’ may be as general as stability relative to other states or as specific as the efficiency of a particular enzymatic reaction.” Their “functional information” resembles our CSI. They analyze physical, biological, and cultural forms of functional information (e.g., habitable planet/moon systems, enzymes, and human languages).
 - ⁶ Contemporary information theory and complexity science recognize numerous nonequivalent notions of complexity: algorithmic (Kolmogorov), Shannon, computational, structural, hierarchical, thermodynamic, dynamical, ecological, and probabilistic. Each captures different aspects of organization and generative difficulty. CSI uses probabilistic complexity because it evaluates whether a proposed process has sufficient resources to generate a functionally constrained configuration. Algorithmic complexity is complementary but not a substitute, since compressibility does not correlate with functional constraint or generative feasibility. This pluralism is well documented in Maximilian Barnett (2024), David J. LePoire, Leonid E. Grinin, and Andrey Korotayev (2025), and the broader complexity-science literature.
 - ⁷ The exact shape of each rock in my backyard is rare (unique), but such rarity is not due to tight constraints consistent with functional requirements. Such rarity is largely irrelevant to our project.
 - ⁸ What we have in view here are biological functions, but there could be other metaphysical functions that operate at the level of the whole organism.
 - ⁹ Descriptive complexity (Kolmogorov or algorithmic complexity) is the length of a minimum description that characterizes, or computationally generates, a given pattern. Low descriptive complexity obtains when the observed item can be described more briefly than comparable random noise by means of meaningful contextual knowledge (e.g., a database of comparable items) (see Ewert, Dembski, and Marks II 2015). Algorithmic measures therefore classify random strings as highly complex, even though they lack functional organization. CSI requires not merely complexity but a match to an independently given functional specification, and thus probabilistic complexity is the appropriate concept for assessing whether stochastic physical processes can generate such functional organization. This explains why algorithmic complexity and CSI complexity do not coincide.
 - ¹⁰ Lewis and Barnes (2016, 109) indicate that gravity is fine-tuning to one part in 10^{35} (not 10^{60}). Regardless of the exact number, the extreme rarity of cosmic life-friendliness is well established.
 - ¹¹ Anthropic selection accounts of fine-tuning, even if they succeed in removing “surprise” about a cosmos fit for life, do not undermine our thesis that such fine-tuning is CSI. Granted, we should not be surprised that we inhabit a cosmos structured with sufficient CSI to make life possible (absent such fine-tuning, we would not exist). Those unimpressed by anthropic accounts often place their bet on the discovery of a small set of cosmic constraints that necessitate the coincidences that constitute life-friendly CSI. That would relocate the primary repository of cosmic CSI to those fundamental constraints.
 - ¹² Other factors include the right timing and amount of delivery of life-critical materials by impacts from space objects and the right planetary rotation rate in conjunction with other parameters (Lammer et al. 2009). Moons and giant planets are even less likely to be habitable than small rocky planets for many other reasons, as Helmet Lammer et al. (2009) show.
 - ¹³ We allow that biological life might be valuable for other reasons not connected to its instantiation of CSI. Minimally, however, our argument shows that CSI is a partial ground, if not a total ground, of the value of biological life.
 - ¹⁴ Mario De Caro and David Macarthur’s (2010) anthology focuses on options in the space between strict scientific naturalism (which typically denies real normativity) and Platonism. “Liberal naturalism” is suggested as an appropriate label for many of the positions that stake a claim within that middle ground.
 - ¹⁵ Some proteins are not as rare as Axe’s estimate, but they perform very simple functions. Most proteins are extremely rare, as various studies show (Tian and Best 2017; Reidhaar-Olson and Sauer 1990).
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Cessationism's Foundational Influence in Evolutionary Thought

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The doctrine of cessationism traces back to the medieval and early church periods but gained prominence in the sixteenth century with the Protestant Reformation and continued in later centuries. Historians have suggested cessationism had influences on later skeptical traditions such as the eighteenth-century movements against miracles and the Enlightenment. Less attention has been paid to the relationship between cessationism and evolutionary thought. This article investigates this relationship and argues against the extremes of (i) the lack of any substantial influence and (ii) straightforward, linear influences where skepticism of miracles is taken merely to imply a naturalistic origins of the world. Instead, cessationism provided various theological substrates upon which several significant evolutionary arguments and traditions were developed.



Introduction

Cessationism, a popular Christian doctrine, states that divine miracles, such as recorded in the New Testament, ceased to occur during or shortly after the Apostolic Era. Cessationist sentiment traces back to the early church period but escalated significantly in the sixteenth century with the Reformation and rise of Protestantism. Historians have explained both the history of cessationism and, to a lesser extent, its implications and interactions with later movements, such as eighteenth-century miracle skepticism and the Enlightenment (Heyd 1995, 176, 180). Less attention has been paid, however, to the relationship between cessationism and the rise of modern evolutionary thought. This despite the fact that (i) cessationism was at the center of a paradigm shift in how the natural relates to the supernatural that Carlos Eire (2023, 60) has argued “was equal in magnitude to the rejection of the geocentric cosmos by Copernicus and Galileo,” and (ii) that modern evolutionary theory itself brought about a similar shift of enormous magnitude.

Here, I explore the parallels, anticipations, and relationships between cessationism and evolution, and I warn against two misconceptions: first, that evolution is a scientific theory and as such is aloof of such theological influences, and second, that evolutionary thought—claiming the world arose naturalistically, without the need for miraculous intervention—would be an obvious result of a movement that resulted in increased skepticism of miracles. For the first misconception, there clearly are anticipations in cessationism and echos within the evolution literature that suggest a historical connection. For the second misconception, though a smoking gun can be found (such as Charles Darwin rebuking miracles to defend his theory of evolution), parallels of cessationism in the evolution literature are far richer, more complex, and arguably more influential than mere brute miracle skepticism.

At a foundational level, the cessationism/miracle skepticism paradigm shift provided various theological and philosophical themes and arguments against miracles. It is these themes—more often than an overarching, brute conclusion that miracles are impossible—that appear as substrates upon which evolutionary arguments are constructed. In particular, this article suggests three such parallel relationships. First, cessationism’s recruitment of natural philosophy as an antidote to Enthusiasm, and evolution’s intellectual necessity argument. Second, cessationism’s guilt-by-association argument, and evolution’s *infra dignitatem* argument. And third, cessationism’s divine parsimony argument, and evolution’s greater god theology. In this article, I review the history of these associated elements within cessationism and evolution, revealing parallels and interactions.

Early Cessationist Traditions

For two thousand years Christians have wondered if the types of miracles recorded in the New Testament were normative and could potentially occur at any time or if they were particular to biblical times and the early years of the

church. The book of Acts (2:16–17 NKJV) records that Peter announced that the miracles at Pentecost—such as many speaking in different tongues—were foretold by the Old Testament prophet Joel to occur “in the last days.” Were these last days limited to the early centuries of the church? This was an active subject of inquiry in the early and medieval periods of church history.

John Chrysostom (c. 347–407) continually heard it asked, “*διὰ τί τότε γλώσσαις ἐλάλουν πάντες οἱ βαπτιζόμενοι?*” [Why, in the Apostolic era but no longer in the fourth century, did all the baptized speak in tongues?]. As we shall see, Chrysostom’s response—that such visible signs were for the ignorant crowd—would become a cessationist mainstay. For while visible signs were needed to overcome the “*ανοητότερον*” [foolish] minds of earlier people, mature believers understood that the forgiveness of sins was not a “*αἰσθητὸν ἐνδείκνυται σημεῖον*” [perceptible sign], hence Chrysostom (1862, col. 459) could state, “*Ἐγὼ μὲν οὐκ ἔχω σημεῖον*” [I do not now need signs].

Similarly, in his early writings, Augustine (354–430) argued that for his predecessors, “the problem was to get people to believe before anyone was fit to reason about divine and invisible things,” but once the Catholic Church was established, “miracles were not allowed to continue till our time, lest the mind should always seek visible things, and the human race should grow cold” (Burleigh 1956, 248). Gregory the Great (c. 540–604) argued that just as a newly planted shrub requires watering, the early church needed “*miraculis fuerat nutrienda*” [miracles for nourishment]. But miracles ceased in the mature church, just as “*semel radicem fixerint, in rigando cessamus*” [watering is ceased once the shrub takes root] (Gregorii 1849, col. 1215). In his commentary on Matthew, Aquinas (c. 1225–74) turned to Augustine to explain the contemporary absence of miracles; namely, that the greatest miracle is already visible—the conversion of the entire world by fishermen: “*[Q]uia per duodecim vilissimos homines piscatores totus mundus conversus est*” [for the whole world was turned round by twelve simple men who were fishermen]. Additional miracles were unnecessary (Aquinas 2020, 10:1–15). These were early variations of what I will refer to as (i) the “guilt-by-association” (i.e., miracles are needed by and associated with the lowly and uneducated), and (ii) “divine parsimony” (i.e., God uses miracles only where required and does not perform superfluous or redundant acts) arguments.

Other such rationale against the continuation of miracles included that they would allow for weak faith to persist, that to suffer for Christ is much greater than to experience miracles delivering one from persecution, and that contemporary teachers did not rival the apostles. But these arguments against the continuation of miracles, a position that would become known as cessationism, were not often tightly held. This was nowhere more evident than in *City of God*, Liber XXII, Caput VIII, whose title left no doubt of Augustine’s reversal and continuist conviction that miracles were, indeed, “*non desinunt*” [not ceased]. While Augustine (1909, book 22, 566) recognized that interlocutor’s inquiries

about why traditional miracles were no longer wrought could be answered with cessationist rationale, the church father was at pains to clarify that indeed the premise was false, for “*etiam nunc fiunt miracula in eius nomine*” [even now miracles are done in his name] (Augustine 1909, book 22, 577). Augustine (1909, book 22, 577) recounted more than twenty miracles, some in considerable detail, but there were many more, as “*incomparabili multitudine superant*” [they surpass in incomparable numbers]. Augustine had fifty more examples at the ready, but “*Quid faciam?*” [What should I do?]. A deadline loomed, and he had to finish the work. The problem was not a lack of contemporary miracles but that “*sciuntur vix*” [they are hardly known], as the miracles were not usually memorialized and thus easily forgotten (Augustine 1909, book 22, 577). The young Augustine’s cessationist rationale for the lack of miracles had now, in the *City of God*, completely reversed, transforming into a concern that there was an overflow of miracles that was not sufficiently recorded and appreciated.

Aquinas also could revert from cessationist to continuist positions. His cessationist rationale—that post-apostolic contemporary miracles were superfluous compared to earlier miracles—was elsewhere countered by his continuist rationale that miracles serve to confirm preaching and bring repentance. For example, Aquinas affirmed that religious belief was (i) to think with assent and (ii) meritorious, in part because divine teachings can be certified by miracles. In other words, Aquinas (2006, Q2, 1, 1; Q2, 9, 3) made miracles fundamental in the defense of rational religious belief. In Aquinas, following earlier thinkers, we see two fundamental arguments—a cessationist argument from divine parsimony and a continuist argument that miracles serve to certify accompanying doctrine—that would be vigorously deployed in later centuries.

Aquinas also recognized what would become the important middle category of preternatural, in contrast to genuine supernatural and natural phenomena. Whereas the supernatural could be caused only by God’s unmediated action, and natural phenomena were what normally occurred, the preternatural were rare events that were perhaps clever manipulations of the natural world, including plagues, comets, earthquakes, prodigies, and monstrous births. Though seemingly supernatural, the preternatural were believed to be caused by created beings, often thought to be demonic, and not genuinely supernatural. Finally, I note that Aquinas was reported to have firsthand experience with miracles; specifically, he was reported to have observed and experienced levitation on multiple occasions (Eire 2023, 40, 50).

Catholicism and the Imperative of Cessationism

While proto-cessationist sentiment could be found in the first millennium and half of the church’s history, opposing sentiment was not uncommon—even from the same person—and the topic was, at least at times, not controversial or contentious. This changed with the coming of the Reformation and the

sixteenth century. The crucial role cessationism would come to play was, at least in part, the result of the contentious relationship between the Protestant Reformers and Catholicism. The Reformers did not merely have doctrinal disputes with the Catholic Church. They consistently viewed the church as nothing less than satanic. Luther (1483–1546) described the Catholic Church as led by the Antichrist (Eire 2023, 61), Calvin (1509–64) compared Catholic priests to Egyptian magicians (Eire 2023, 294), and Protestants “everywhere, at all levels” accused the Catholic Church of being possessed by Satan and his antichrist, often with “obsessive zeal” (Eire 2023, 61). Scottish mathematician and scientist John Napier (1550–1617) listed twenty-one medieval popes, among others, as frauds, necromancers, and magicians, and English churchman John Bale (1495–1563) referred to the Catholic Church as “the synagogue of Satan,” the “spouse of the devil,” and “the devil’s unholy vicar at Rome” (Eire 2023, 61–62). These brief examples, and there are many more, demonstrate the enormous rift between the two groups.

One rather immediate problem with the Protestant Reformers’s rejection of and disdain for the Catholic Church, however, was the wealth of miracles Catholics could claim. The church was very much at one with the miraculous. From the weekly mass wherein the Eucharist underwent a material transformation into the body and blood of the Lord Jesus to dramatic visions and levitations, the supernatural was very much a part of Catholicism. Supernatural events associated with Catholicism were also well documented, so well that the legitimacy of the many miracles associated with and claimed by Catholicism was often beyond dispute. On the one hand, the church’s impressive miracles provided what seemed to be an unassailable doctrinal defense and confirmation. For if miracles serve to authenticate one’s doctrine, then the Catholic Church was in good standing. On the other hand, the church’s miracles provided, by contrast, a seemingly lethal critique of Protestantism, with its stark absence of miracles. These were lines of attack used by Lord Chancellor Thomas More (1478–1535) in his printed 1529–32 debate with English Protestant linguist William Tyndale (c. 1494–1536). More scathingly argued both that the Catholic Church’s miracles were the surest proof of the church’s divine origin and that the Protestant Churches’ lack of miracles proved beyond a shadow of a doubt their demonic origin (Eire 2023, 66).

Such arguments were common and sometimes reinforced with spectacular examples of miracles, such as those provided by the Spanish mystic Teresa of Avila (1515–82). She experienced trances with visibly altered states, ecstasies, and visions. During her ecstasies, she sometimes rose into the air. These levitations were both frequent and spectacular. Her reputation spread through Spain and beyond, though, especially as she was a woman, with no small amount of skepticism. Many in the Catholic Church suspected her to be unorthodox, unholy, under demonic influence, or otherwise fraudulent. But her trances and

levitations were witnessed by many. Some eyewitnesses testified under oath that the raptures they saw were so constant and numerous that they “couldn’t even dare to count them” (Eire 2023, 72–74). In addition to these many eyewitness accounts, under pressure, Teresa wrote extensively of her experiences, providing a first-person, empirical perspective. Such evidence was difficult to deny, and Teresa occupies an immense role in the history of Catholic mystics and holy levitations (Eire 2023, 72–74).

Not surprisingly then, Teresa of Avila provided a favorite example of Catholic miracles for Spanish apologists in their refutations of Protestantism. According to Diego de Yepes (1530–1616), she was God’s *instrumento para hacer guerra á los hereges* (instrument of war against the heretics). For “[f]ue tambien esto traza de Dios, que casi al mismo tiempo que aquel malvado Lutero comenzó á maquinar sus mentiras y engaños, y á confeccionar la ponzoña con que despues dió la muerte á muchos: en esa misma ocasion andaba el Señor formando esta Santa para que fuese como triaca de esta ponzoña” (it was a design of God, that when that wicked Luther began to devise his lies and deceptions, and to concoct the poison with which later he brought death to many: at that same occasion, the Lord formed this Saint, for service as an antidote to this poison) (Yepes 1776, 6).

Jesuit architect Juan de Herrera (1530–97) wrote that Teresa had crushed Luther’s head with the Rock of Christ, and Dominican bishop Juan Gonzalez (1545–1618) wrote that she had effectively won the war against Protestants. Luis de Leon (1527–91), editor of her collected works, wrote that “God willed at this time—when it seems that the devil is triumphant among the throng of infidels who follow him . . . to disgrace and ridicule him by putting before him not some valiant and learned man, but a lone poor woman, to sound the challenge and raise the battle flag” (Eire 2023, 67). In addition to Teresa of Avila, Catholic apologists could cite a great many other miracle accounts, including many levitators both documented and depicted in countless Catholic engravings and paintings. Accounts of levitation dated back to the early church (when they were often taken to be demonic), but they dramatically increased in the early thirteenth century, perhaps as a result of rising literacy rates and the growing number of hagiographies. No exhaustive or authoritative list of medieval levitators has been attempted, but it would include Dunstan of Canterbury (c. 909–88), Christina the Astonishing (c. 1150–1224), Francis of Assisi (c. 1181–1226), Bernard of Clairvaux (1090–1153), Dominic de Guzmán (1170–1221), Anthony of Padua (1195–1231), Elizabeth of Hungary (1207–31), Bonaventure (1221–74), Albert the Great (c. 1200–80), Thomas Aquinas, and Catherine of Siena (1347–80) (Eire 2023, 38–40).

The challenge presented to Protestant Reformers by these many reported miracles associated with the Catholic Church was significant. Even most Reformers agreed that genuine miracles were a sign of true doctrine. Miracles served to authenticate doctrine; therefore, the many well-documented Catholic

miracles appeared to refute the core claim of the Reformers that so much of Catholic doctrine was, in fact, false. If even a fraction of the reports were accurate, and the miracles genuine, the Reformation would fail in its most fundamental claims. It was an existential challenge for the Reformation. The Catholic miracle accounts had to be addressed and nullified. The obvious move was a complete rejection of Catholic miracles. Perhaps certain miracle reports were exaggerated or outright false. Perhaps certain phenomena were natural events that were not yet understood and so reported as miracles. Perhaps Satan was cleverly manipulating the natural world, fooling observers into thinking they had witnessed a genuine miracle. In one way or another, Protestants argued that the Catholic miracles must not be genuine, for if genuine miracles implied true doctrine, then by *modus tollens* false doctrine (as the Reformers insisted the Catholic doctrine was) implied false miracles. This was the doctrinal criterion—the Reformers’s core doctrinal claims required that the Catholic miracles were not genuine.

Observable miracles were not the only Catholic claim of supernatural phenomena rejected by Protestants. Another crucial point of contention was that of extra-biblical revelation and canonicity. This arose prominently in William Whitaker’s (1547/8–97) extensive rebuttal to the Catholic Tridentine view of scripture as articulated by Robert Bellarmine (1542–1621) and Thomas Stapleton (1535–98). Whitaker, a professor of Divinity at Cambridge from 1579 to 1595, expressed his views in published lectures entitled “Disputation on Holy Scripture,” including his rejection of the Catholic canonicity claim; that is, the claim to have the authority and knowledge of what constituted genuine scripture. That claim would require extra-biblical revelation. Luther had allowed for direct divine inspiration and even doctrine “yet to be received,” but only if confirmed by “signs” (Heyd 1995, 26–27). But that opened the door to the Catholic’s canonicity claim. This was not a dispute over a specific doctrine. Instead, this was a broader question of extra-biblical revelation. What was needed was a refutation, in principle, of extra-biblical revelation, and that was supplied by the brute claim of cessationism. When Catholic doctrine, thought to be false, was used to conclude that Catholic miracles were not genuine, cessationism had been the conclusion. But now, cessationism had become the premise. It was crucial to Whitaker’s argument and something he took as a given. Stapleton countered that a Protestant determination of canonicity would, in like manner, entail extra-biblical revelation. But Whitaker argued that scripture is understood through no other sources than (i) scripture and (ii) the inner testimony of the Holy Spirit. True, the Spirit is not “the same as the books themselves; yet it is not external, nor separate, or alien from the books” (Milne 2007, 55). Thus, Whitaker argued that Protestants could know scripture as scripture without extra-biblical revelation but that the Catholic canonicity claims, on the other hand, were refuted by cessationism (Milne 2007, 52–57).

Enthusiasm

In addition to the Catholics, another sixteenth and seventeenth century element claiming miracles, including extra-biblical revelation, were the Enthusiasts—a term that was used imprecisely and had strong overlap with the anabaptists and radical reformers. Thus, the Enthusiasts were by no means a single, homogenous group but rather a wide range of groups, movements, and individuals. From the uneducated to the scholarly, and from the fanatical to the elite—the label of enthusiasm was widely applied. As Michael Heyd (1995, 2) put it:

The rejection of enthusiasm is well known to anyone studying the intellectual and religious history of the period. The term itself became a standard label by which to designate individuals or groups who allegedly claimed to have direct divine inspiration, whether millenarians, radical sectarians, or various prophesiers, as well as alchemists, “empirics” and some contemplative philosophers.

The Enthusiasts tended to reject historical Christian doctrine such as original sin and salvation via faith in Jesus (Heyd 1995, 26) and made extreme eschatological proclamations such as an imminent apocalypse. They claimed miracles, prophecies, and revelations via visions and dreams unmediated by scripture. Such claims of absolute religious truth privileged through direct divine inspiration posed yet another serious challenge to Protestant Reformers, and the Enthusiasts were viewed as a threat throughout the sixteenth and seventeenth centuries.

The Enthusiasts’s claims of direct divine inspiration could be countered with the Reformation’s rallying cry of *sola scriptura*—the restriction of religious truth to the scriptures. The Enthusiasts’s also presented an opportunity for the doctrinal criterion—their doctrinal deviations, even if nuanced, were targets for critics both on the continent and in England in the sixteenth and seventeenth centuries to discredit their supernatural claims (Heyd 1995, 25–6; Milne 2007, 125, 215–6).

Catholics also found useful applications of the doctrinal criterion. When Blaise Pascal’s (1623–62) niece’s eye was healed in 1656—one of the best documented apparent miracles in history—though Jansenists such as Pascal interpreted the healing as a divine vindication, Jesuit critics claimed it was a divine warning against their heresy. In other words, “[t]he clinching evidence for the authenticity of an ambiguous miracle was doctrinal” (Daston 1991, 118). This was a reversal of the traditional formula in which miracles were assumed to certify the messenger and his doctrine—now it was the doctrine that certified the miracle. As Pascal put it, “One must judge doctrine by miracles, and one must judge miracles by doctrine” (Daston 1991, 107, 119).

Thus, the doctrinal criterion served to “weaken dramatically the evidentiary force of miracles” (Daston 1991, 119). But the doctrinal criterion was vulnerable to those miracle-claiming Enthusiasts, such as the French Prophets in the late

seventeenth and early eighteenth centuries, who even critics admitted leaned toward orthodoxy and were “typically Calvinistic” in their doctrines and teachings (Heyd 1995, 166, 172–73). Their supernatural claims would have to be refuted with more robust attacks than the doctrinal criterion. Thus, in the seventeenth and early eighteenth centuries, the brute claim of cessationism and, beyond cessationism, a broad skepticism of miracles in general, increased. As Heyd (1995, 173–74; emphasis added) explains, “the Protestant principle that miracles ceased to occur after the Apostolic period . . . was a basic Protestant supposition since at least the middle of the sixteenth century. Faced with the challenge of the French Prophets, it was a principle repeated by Protestants of all persuasions . . . Protestant theologians tended to give *naturalist accounts for [contemporary] miracles*, or at least to claim the existence of natural causes, even if unknown. We find this already in a sermon originally delivered by John Tillotson in 1679.” Likewise, influential French philosopher Pierre Bayle (1647–1706) argued that ordinary laws are sufficient to demonstrate God’s will and benevolence, whereas portentous interpretations lead to superstition and idolatry. For Bayle, a naturalized religion was also a sounder religion (Daston 1991, 123). Here, we can see early signs of cessationism leading to naturalism.

The Expansion of Cessationism

The acceptance of cessationism was not limited to narrow theological discourse. By the end of the sixteenth century, cessationist doctrine, as a new truth, was reaching wider audiences. In 1597, King James wrote that since “the establishing of his Church by the Apostles, all miracles, visions, prophecies & appearances of Angels or good Spirits, are ceased; which served only for the sowing of faith, and planting of the Church” (Milne 2007, 111). Within a decade, Shakespeare made use of such conclusions. In *All’s Well That Ends Well*, Lafew states, “They say miracles are past, and we have our Philosophicall persons, to make modern and familiar things supernaturall and causelesse.” In *Henry V*, the king is wonderfully transformed, a change the Archbishop of Canterbury agrees must be natural, “for Miracles are ceast” (Kay 1999, 165).

Perhaps the most definitive sign of the rise of cessationism was in the 1647 Westminster Confession of Faith (WCF)—for many the gold standard amongst Protestant confessions. It began with the unequivocal statement that whereas in the past “it pleased the Lord, at sundry times, and in divers manner, to reveal Himself, and to declare that His will unto His Church,” scripture is now most necessary—“those former ways of God’s revealing His will unto His people being now ceased” (1.1). Simply put, all miraculous modes of divine revelation had ceased, since scripture was complete.

Cessationism, or at least full-blown cessationism, was not held by all. One concern was that while cessationism provided a strong rebuke to Catholicism and Enthusiasm, its skepticism of miracles could inadvertently aid atheism and

pantheism (Heyd 1995, 175). Leading theologian John Owen (1616–83), for example, while fully subscribing to the WCF's doctrine of the sufficiency of scripture, also allowed for the possibility of ongoing divine miracles (Milne 2007, 8). What was needed was a delineation of genuine miracles, and in the seventeenth and early eighteenth centuries, writers produced a flurry of definitions, requirements, warnings, and the like declaring how miracles were to be understood, to rebuke Enthusiasm but not fuel atheism. For example, as mentioned earlier, miracles accompanied by false doctrine were rejected according to the doctrinal criterion. But miracles announced with orthodox messages could also be rejected, this time according to divine parsimony—God would not provide miracles for known truths dispensed long ago. That would be redundant and superfluous (Heyd 1995, 175–76). Likewise, miracles lacking doctrine altogether could be safely rejected, as Joseph Glanvill (1636–80) did in the case of the cures of the Irish faith healer Valentine Greatrakes (1628–82) (Daston 1991, 120). As Heyd (1995, 175–76) puts it, these combined constraints on miracles placed Enthusiasts in a no-win dilemma—the Enthusiasts's miracles could be rejected regardless of their doctrine.

Beyond this dilemma, divine parsimony proved to be a durable argument for cessationism. It traced back to the early church, and it saw no less use in the seventeenth century. To be clear, divine parsimony was not an all-out attack on miracles. John Tillotson (1630–94) argued that the biblical miracles helped warrant acceptance of Christian doctrines (Larmer 2025, 7), yet he also made the cessationist argument from parsimony that “when the end is obtained, the means cease; and the wise God, who is never wanting in what is necessary, does not use to be lavish in that which is superfluous.” Similarly, Edward Stillingfleet (1635–99) appealed to divine parsimony: “What imaginable necessity or pretext can there be contrived for a power of miracles, especially among such as already own the Divine revelation of the Scriptures?” Why reprove the already proven? (Daston 1991, 114–15).

On a parallel but equally effective track, miracles were associated with “the bumptious and unlettered,” thus anticipating “Hume's guilt-by-association argument that wonders proliferated most among the ignorant and barbarous” (Daston 1991, 121). Surely miracles—a lowbrow necessity for the faith of what Luther described as “the ignorant, unbelieving crowd” (Eire 2023, 60)—were beneath God's dignity.

Among orthodox British theologians, not to speak of Deists like Toland and Anthony Collins, portents and miracles played an ever more modest role in Christian apologetics. Although none of them would have thought of denying their existence or importance in the early Church, late seventeenth-century theologians assumed an ever more condescending tone toward their predecessors for requiring such a vulgar sort of proof. Whereas Christ had

been forced by his motley audience to address “the lower faculties of the Soul, phancy and imagination” with showy miracles, nowadays “all things are to be managed in a more sedate, cool, and silent manner,” by invoking “steady and calm arguments.” Just because miracles were “such sensible Demonstrations,” they penetrated even “the weakest Judgments and strongest Imaginations,” but the enlightened had no need of them. (Daston 1991, 120–21)

Another reason to be skeptical of miracle claims was the argument from ignorance. As Glanvill put it, “we are ignorant of the Extent and Bounds of Natures Sphere.” Therefore, exceeding the known powers of nature was an insufficient criterion for putative miracles (Daston 1991, 117; Larmer 2025, 10).

Natural Philosophy

Amidst these seventeenth-century debates, the emerging natural philosophy raised an important question for cessationists: Would the new science be an antidote to Enthusiasm or a manifestation of it (Heyd 1995, 157)? An early hint came from Francis Bacon (1561–1626), for many the father of modern science. Bacon (1829, 157) did not deny miracles but argued from parsimony that “*nec Deus unquam edidit miraculum, quo converteretur atheus, quia poterat ipso naturae lumine ad notitiam Dei perducī*” [God did not produce miracles to convert the atheist because he can arrive at the knowledge of God by the light of nature]. Therefore, atheists are to be converted by the contemplation of nature that is provided by natural philosophy. Similarly, the new science was also “*certissimam superstitionis medicinam*” [a cure for superstition] (Brougham 1835, p. 141), such as held by the Enthusiasts. Thus, Bacon provided a sanction for science to focus on natural laws and processes, a fact that, as I will discuss, Henry Peter Brougham (1778–1868) would amplify in the nineteenth century.

In the latter seventeenth century, English churchman Thomas Sprat (1635–1713), fellow of the Royal Society and author of the 1667 *History of the Royal Society of London*, elaborated on how the new science could help deflect Enthusiasm. Sprat (1667, 35) explained that Bacon and his followers had not only rejected Aristotelianism but had proposed the “right course of slow, and sure Experimenting.” The Experimental Philosopher “will be very scrupulous . . . He cannot suddenly conclude all extraordinary events to be the immediate Finger of God . . . He cannot blindly consent to all imaginations of devout men . . . He cannot be forward to assent to *Spiritual Raptures, and Revelations*” (Sprat 1667, 358–60). Sprat’s (1667, 358–60) warnings did not stem from atheists but from the “imaginations of devout men” and “disguises of *Faith*.” Thus, in the new experimental philosophy, enthusiasm ennobled the rejection of the supernatural and in its place a shift toward strict naturalistic explanations. This way, the philosopher would help identify those natural events the Enthusiasts had misinterpreted as omens, wonders, and miracles. The philosopher—thus so directed to identify and filter out the many false miracle claims of the

Enthusiasts—would not detract from the biblical miracles but confirm them all the more.

But does he by this diminish the *Authority of Ancient Miracles*? or does he not rather confirm them the more, by confining their number, and taking care that every falshood should not mingle with them? Can he by this undermine *Christianity*, which does not now stand in need of such extraordinary Testimonies from *Heaven*? or do not they rather in danger it, who still venture all its Truths on so hazardous a chance? Who require a continuance of *Signs*, and *Wonders*, as if the works of our *Savior* and his *Apostles* had not been sufficient: who ought to be esteemed the most carnally minded? the *Enthusiast*, that pollutes his Religion, with his own passions? or the *Experimenter*, that will not use it to flatter, and obey his own desires, but to subdue them? who is to be thought the greatest enemy of the *Gospel*? He that loads men's *Faiths*, by so many improbable things, as will go near to make the reality itself suspected? or he that only admits a few *Arguments*, to confirm the *Evangelical Doctrines*, but then chooses those, that are *unquestionable*? It cannot be an ungodly purpose to strive to abolish all *Holy Cheats*. (Sprat 1667, 360–61)

Now, in Sprat, the experimental philosopher, shunning the miraculous, is a defender of the Gospel and juxtaposed against the Enthusiast. Sprat thus prescribed a systematic study of nature in which, ultimately, science's objective was to discover naturalistic explanations for all phenomena. For Sprat and seventeenth century natural philosophers, viewing divine providence as resulting from God's regular laws and processes, rather than supernatural intervention, helped them avoid the dangers of Enthusiasm (Heyd 1995, 158).

Later Cessationism

In the eighteenth and later centuries, cessationism expanded its claims. Originally, cessationism had allowed for miracles to persist beyond biblical times, into the early-church Apostolic Age, before they ceased altogether. The next logical step, taken by English clergyman Conyers Middleton (1683–1750) at mid-century, was to reject the miracles of the Apostolic Age (Middleton 1749). Middleton leaned heavily on the arguments handed down from the previous centuries, including rationalist, anti-Catholic, and guilt-by-association arguments.

For example, the bones and relics of earlier saints were reportedly miraculously discovered and subsequently wrought miracles such as healings. But that did not make sense, for “how can we think credible, that God should withhold his distinguishing favors from his faithful servants when living, to bestow them on their rotten bones?” (Middleton 1749, 23). Furthermore, would God “employ his extraordinary power to no other use, but to perpetuate a manifest imposter [Catholicism] in his church?” (Middleton 1749, 23). Or again, regarding the visions of resurrected martyrs, “there seems to be the greatest reason to suspect

that they were all contrived, or authorized at least, by the leading men of the Church, for the sake of moderating and governing with more ease the unruly spirit of the populace" (Middleton 1749, 84).

The precise dating of when miracles ceased in the Apostolic Age had always varied among different commentators, but Middleton now removed miracles from the Apostolic Age altogether. Middleton's backdating of miracles to the biblical era was controversial but ultimately quite influential, as evidenced by B. B. Warfield's (1851–1921) weighty endorsement at the opening of the twentieth century. Warfield, last of the influential nineteenth-century reformed "Princeton theologians," commended Middleton in his own cessationist tome, *Counterfeit Miracles*. Warfield (1918, 30) described Middleton as reaching the "correct conclusion" and repeated several of Middleton's rationalist God-wouldn't-do-it-that-way and guilt-by-association arguments. "After a century and a half the book remains unrefuted," Warfield (1918, 31) concluded, as "its main contention seems to be put beyond dispute."

In the twentieth century, cessationism continued to gain strength. At mid-century, John Walvoord (1910–2002), president of Dallas Theological Seminary for a third of the century, affirmed "the power of God to perform miracles," but explained that the gift to perform miracles "ceased at end of the apostolic age," for with the completion of the New Testament, "the need for further unusual display of miraculous works ceased," as "the written Word speaks for itself" (Walvoord 1954, 174–80). Similarly, James Oliver Buswell (1895–1977), World War I chaplain, president of Wheaton College and the National Bible Institute/Shelton College, and dean of Covenant Theological Seminary, wrote in his *Systematic Theology* that "God generally ceased to work through 'sign' miracles when the New Testament was finished," for "the 'miracle of grace,' the witness of the Spirit, answered prayer, and supremely, the written Word, shall be the chief sources of knowledge of Himself for His people during this age" (Buswell 1962, 181).

Rejection of Miracles

Unlike deism, which usually was considered unorthodox and was relatively short-lived, cessationism typically was situated squarely within orthodoxy and has remained prolific since the Reformation. Not surprisingly, cessationist sentiment did not remain neatly contained within cessationism's narrow initial theological definition. Heyd (1995, 176, 180) explains how reinforced cessationism, resulting from opposition to Enthusiasm, helped usher in a greater role of reason in theological discourse and a foreshadowing of the eighteenth-century Enlightenment:

The growing role of reason as a critical factor in Protestant thought in the late seventeenth century . . . is well known, of course. My point, however, is that this new role of reason emerged specifically in the confrontation with

enthusiasm. Indeed, the debate with the enthusiasts may well have been a leading cause for the increased emphasis on reason in the theological discourse of that generation . . . In confronting the enthusiasts, Protestant theologians on the eve of the Enlightenment thus reversed the traditional relationship between faith and reason, and turned the latter into a judge of the former.

One way cessationism anticipated and assisted the eighteenth-century Enlightenment was through the increasing views of miracles as refuted. With the sixteenth- and seventeenth-century cessationist doctrines barely settled, philosophers and commentators increasingly began calling for the outright rejection of miracles altogether, often leveraging cessationist arguments.

For example, as with the divine parsimony cessationist argument, the emerging rejection of miracles also incorporated arguments from parsimony. Miracles were not needed, it was often argued, because the infinite and perfect God can be expected to create a world that also is infinite in its perfections. Therefore, there is no need to intervene with miracles. English philosopher and deist Charles Blount (1654–93), in his 1683 work *Miracles, No Violations of the Laws of Nature*, argued that “the power of God and the power of nature are one and the same, and that all her laws are his eternal decrees,” therefore, to think that unusual events are miracles, which are “effected by the immediate Power of God” is “point blank repugnant to the fundamental Laws and Constitutions of Nature, which he and his infinite Wisdom hath made, and made so ample and fertile, as to extend to the certain production of whatever Events he has willed and decreed . . . the Power of God being infinite, that of Nature must be so too, because one and the same with the Power of God” (Blount 1683, ii–iv). In other words, God’s natural laws are fully capable of fulfilling divine will, such that there is no need for divine interventions. Any so-called “miracles” must simply be the production of natural laws. For example, botanist Nehemiah Grew (1641–1712) argued that the Bible’s miracle stories were real but not supernatural. Yes, the walls of Jericho fell, but they did so as a result of an earthquake. There was nothing supernatural, for it was a result of natural law in action. The miracle is in the precise timing, which only God could have arranged by building it into the laws of nature from the beginning (Westfall 1958, 99). Similarly, mathematician and philosopher Gottfried Leibniz (1646–1716) banished miracles from science. As discussed later, Leibniz did not believe that there is a divine hand involved in the course of history, for this would indicate an unparsimonious creator whose creation is in need of adjustment and tinkering. The providence of God is a result of God’s wisdom and foresight rather than his active role in nature’s history.

It was similarly argued that since natural laws and future particular needs are productions of the same creator, they must be consistent. God shapes nature’s general laws and the future plan such that the former is capable of producing

the latter. Anything less would be a sign of an unworthy creator. As English deist Thomas Morgan (1671/2–1743) wrote in 1741 that nature's "established general Laws" were sufficient and that the "original Plan was so perfect as not to require any farther Alterations or Amendments upon particular Occasions, or arising Incidents in Futurity." Therefore, "these general Laws will account for a particular Providence, and all the Measures which God takes in the Preservation and Government of the World" (Morgan 1741, v–vi). In fact, the very greatness of God is at stake.

Now, who can sufficiently admire this Government and Direction of Nature, by general Laws, such as being constantly and steadily acted upon and kept to, may obtain and secure the best Order and Constitution of Things upon the Whole, without obliging the Deity, or Author of Nature, to suspend his Laws, or alter his prescribed Rules and Measures of Action, by frequently and interposing on particular Incidents and Emergencies? One of these argues the most perfect Wisdom, Foresight, and Contrivance; whereas the other must necessarily imply Weakness, Imperfection, Uncertainty, and Want of Foresight. We do not find, that the Deity, or universal Cause and Agent, ever suspends or alters the mechanical Properties of Matter, the Laws of communicating Motion, the Forces and Directions of the heavenly Bodies, The natural Sensations, Appetites, and Instincts of Animals; or, in a Word, any of the general Laws of Nature, or prescribed Rules and Measures of his Agency, to answer particular Ends and Purposes, which may be supposed not to have been foreseen or sufficiently provided for. Such a Supposition would be unworthy of God, as the Creator and Governor of the World, and the universal Cause, Preserver, and Director of Nature. (Morgan 1741, 76–77)

Thus, it follows for Morgan (1741, 96) that God must not "miraculously interpose" in nature "because this would subvert the whole Order of the Universe, and destroy all the Wisdom and Contrivance of the first Plan."

The argument could be stripped down to a matter of divine contradiction. As Blount (1683, iv) explained, if a miracle is defined as an event "contrary to the Laws of Nature, or which cannot possibly follow from her fixed and immutable Order: then I dare not believe that any such Miracle hath ever happened in Nature, lest I oppose God to God, that is, admit that God changes his own Decrees; which from the Perfection of the divine Nature, I know to be impossible." Similarly, English freethinker Peter Annet (1747, 20) explained in 1747, "If the laws of nature are the laws of God, and he can subvert those laws, then God can contradict himself, and every absurdity is possible with him; but if this be impossible, then God can do nothing supernatural." In other words, Annet (1747, 32) believed he had disproven miracles, or, as he put it, his "intended subject . . . is the impossibility of miracles."

In addition to these arguments that divine miracles would be unnecessary, inconsistent, unworthy of God, and contradictory, another cessationist category—always lurking in the rejection of miracles literature—was the guilt-by-association argument. Blount (1683, 8) agreed that “[m]iracles have been wrought, *Ad captum Vulgi*, to convince the Vulgar, which was wholly ignorant of the Principles of natural things.” So, the vulgar were convinced not because the miracle actually contradicted natural laws but because the vulgar were “wholly ignorant of the Principles of natural things” and so interpreted the event as such. Likewise, “the Ancients took that for a Miracle” (Blount 1683, 8). Hence it was a “dangerous Error of the Multitude, that God hath created Nature so impotent, and given her Laws and Rules so barren, as that he is compelled sometimes to help her by new Ordinances and supplies of Virtue, in order to her Support and Conservation, and that things may succeed according to his Intention and Design. An Error than which nothing is more . . . unworthy the Majesty of the divine Nature” (Blount 1683, 7–8). Similarly, Sprat (1667, 358–59) explained that whereas “the Experimental Philosopher . . . familiarly beholds the inward workings of things: and thence perceives that many effects . . . are brought forth by the common Instruments of Nature,” nonetheless these effects “use to affright the Ignorant.”

Guilt by association was also prominent in English theologian Thomas Woolston’s (c. 1668–1733) arguments for why the Bible’s miracles must be allegorical and not literal. John 4 (29 NKJV) records the miracle of Jesus telling the Samaritan adulteress by the well “all things that [she] ever did.” But if this “absurd Tale” is taken literally, Woolston (1727, 51) argues, Jesus would be associating with and fulfilling the expectations of an adulteress and her dim-witted neighbors “that the Messiah would be a strolling Fortune-Teller.” The woman, “if she had not been an impudent and graceless Whore, would have gone away blushing, and never have divulged, as the Text supposes she did, her Shame to the Men of Sychar, who too had but little Wit, or they had never stirred from their Homes, to see such a Fortune-Teller upon the Report of a poor Whore” (Woolston 1727, 52). On the whole it was an unbecoming, “silly Story” (Woolston 1727, 48–55), as were many of the other Bible miracles, such as Jesus casting devils out of a madman and into a herd of pigs (Luke 8:26–39). “I could even now laugh at the Thoughts of the Hogs running and tumbling down-hill, as if the Devil drove them” (Woolston 1727, 56).

In addition to the divine parsimony and guilt-by-association arguments, Annet made what to my knowledge was the first argument that miracles undercut the pursuit of scientific knowledge. While many of the arguments against miracles had been ontological (i.e., miracles are not real), this argument was epistemological: the refutation of miracles, regardless of their ontological status, is required for scientific thought. Sprat had argued that the new science should eschew miracles to combat Enthusiasm, but now Annet argued that

miracles must be rejected for science even to be possible. Annet (1744, 75) began with an appeal to induction: “As we know by experience that all men die, and rise no more, therefore we conclude, for a dead man to rise to life again, is contrary to the uniform and settled course of nature . . . To believe it possible contradicts this maxim, That nature is steady and uniform in her operations: For one miracle or action, done contrary to her laws, contradicts all her steady uniform springs and movements; and all that mankind calls truth and reason.” It would be difficult to overstate the threat, as truth and reason are at stake. If we admit a miracle, then:

a way is opened to allow of any impossibility . . . He that is persuaded to believe anything contrary to the known laws of nature, because there are things he does not know, is seduced to renounce his understanding; and, because he knows not all possible things, is persuaded to believe that all things are possible. Positive and presumptive evidence is of no weight against the reason and nature of things. (Annet 1744, 76)

From a philosophical perspective, the argument is problematic. As John Earman (2000, 20) puts it, “Annet seems to be saying that either naïve induction by enumeration works, or nothing does.” But from a historical perspective, it is important. As I will discuss, it anticipates the intellectual necessity argument for evolution and illustrates an intermediary between cessationism and evolution.

These debates, on top of the cessationist doctrines and arguments from earlier centuries, formed much of the basis for David Hume’s 1748 “Of Miracles,” section X of his *Enquiry Concerning Human Understanding* (Larmer 2025, 2, 111ff). In recent decades commentators have attempted to frame Hume as not outright rejecting miracles but rather arguing for their evidential insufficiency (Brooke 1991, 184–85), leaving us forever unable to verify that they ever occurred. But Robert Larmer has demonstrated the failure of this lowering of the bar for Hume. Hume does seem to have believed that he conclusively showed miracles not to have occurred (Larmer 2025, xiii–xvii, 42ff). Larmer and other contemporary critics, as well as eighteenth-century contemporaries of Hume, have levied strong criticism of Hume’s attack on miracles (Larmer 2025, 61ff, 111ff; Earman 2000, 70–71). But as with Middleton, Hume was highly influential in the following decades and centuries (Larmer 2025, xii), and miracles were increasingly rejected outright.

For example, in 1835, theologian David Friedrich Strauss published his *Das Leben Jesu* [*The Life of Jesus*], in which he influentially argued that the biblical miracle stories were neither mischaracterizations of natural phenomena nor reports of actual supernatural events as they were presented but rather a sort of mythology intended to convey underlying truths. In their twentieth-century textbook, Hans Conzelmann and Andreas Lindemann (1988, 62) describe Strauss’s contribution: “The mythical character of the [miracle] narratives

was to be acknowledged. On the other hand, it was clearly evident that all of what is narrated [in the Bible's miracle stories] had to be ahistorical because it contradicted reason." Such reason, in fact, had already been provided by the Enlightenment:

A new leaf was turned over with the Enlightenment in which the application of the principle of reason to the biblical texts led to an altogether new assessment of the theological and especially the historical value of the Bible, and particularly of its miracle narratives . . . The rationalistic explanation of miracles established the argument that it was impossible to break through the laws of nature and that the alleged miracles were to be explained as natural processes. (Conzelmann and Lindemann 1988, 61)

Purported miracles may have been natural processes in disguise, or simply mythological constructs. But in any case, they were not actually supernatural events, leading twentieth-century theologians argued. Rudolf Bultmann (1960, 291–92), for example, made an intellectual necessity argument that historiography required strict naturalism: "This closedness means that the continuum of historical happenings cannot be rent by the interference of supernatural, transcendent powers and that therefore there is no 'miracle' in this sense of the word." David Jenkins (1987, 63), Bishop of Durham, proclaimed that "a God who uses the openness of his created universe . . . to insert additional causal events from time to time into that universe to produce particular events or trends by that eventuality alone would be a meddling demigod, a moral monster and a contradiction of himself." And Pope Francis stated that the species arose from lawlike processes rather than miracles: "When we read about creation in Genesis, we run the risk of imagining God was a magician, with a magic wand able to do everything. But that is not so" (Tharoor 2014).

Evolutionary Thinking

The earlier cessationist and anti-miracle moves influenced nineteenth-century evolutionary theories. Specifically, arguments and proofs that paralleled cessationist and anti-miracle traditions appear as recurring themes in the evolution literature. These typically were expressed—with cessationism and miracle skepticism now well in hand—as truths with little need of justification, by both leading commentators and the theoreticians who were developing the new evolutionary theories. Here, I summarize how three such cessationist doctrines were followed by parallel metaphysical claims that were foundational in the emerging evolutionary thinking.

My first example is the positioning of natural philosophy to oppose Enthusiasm by embracing naturalistic explanations, and a parallel in origin studies, the intellectual necessity of naturalistic explanations. This positioning of natural philosophy took two contrasting forms. First, a study of the regular,

uniform, non-miraculous operations of nature was needed to refute atheism and Enthusiasm. For, as Bacon argued, it is not by miracles but rather by the contemplation of nature that atheists are converted. Furthermore, as Sprat argued, such a study of natural philosophy would help identify those natural events the Enthusiasts had misinterpreted as omens, wonders, and miracles. In these ways, the new science would serve as an antidote to, rather than a manifestation of, Enthusiasm. Second, it was, as Glanvill and others had argued, precisely our ignorance of the “Extent and Bounds of Natures Sphere” that made the Enthusiasts’s miracle claims untrustworthy. Exceeding the known powers of nature was an insufficient criterion for putative miracles, and natural philosophers should focus on naturalistic explanations.

These arguments are examples of how cessationism influenced natural philosophy toward strictly naturalistic explanations. They also provided later centuries with a substrate from which to mandate naturalism in origins studies. Naturalism became an intellectual necessity for the success of science. Consider the remarkable shift signaled in the 1809 claim from early evolutionist Jean-Baptiste Lamarck that “[t]he only knowledge that it is possible for us to acquire is and always will be confined to what we have derived from a continued study of nature’s laws; beyond nature all is bewilderment and delusion: such is my belief” (Gershenowitz 1978, 59). For Lamarck, naturalism was essential for the success of science.

A more elaborate early nineteenth-century example came from no less than the Lord Chancellor of England, the outspoken and prodigious Henry Peter Brougham (1778–1868). Brougham entered the University of Edinburgh at the age of fourteen and found practically no subject beyond his grasp. He was simultaneously an abolitionist, an advocate for the people, and a defender of the throne. His successful defense of Queen Caroline in 1820 against an attack from parliament brought Brougham to the pinnacle of fame. For Brougham, the physical sciences were a hobby, and he issued his own edition of Paley’s *Natural Theology* in 1835. Brougham leaned heavily on Bacon and other cessationist traditions to argue for the necessity of naturalistic explanations. Brougham recalled Bacon’s arguments for the superiority of such explanations, as well as cessationist sentiment that miracles not only could be of demonic origin but also relied on eyewitness testimony, which weakens over time as memories become more distant. According to Brougham, what is needed are not repeated miracles for each generation to see afresh but “a perpetual miracle is a contradiction in terms; for the exception to, or suspension of, the laws of nature so often repeated would destroy the laws themselves, and with the laws the force of the exception of suspension” (Brougham 1835, 209). Furthermore, whereas miracles demonstrate only God’s power, the works of creation demonstrate God’s wisdom and goodness. And unlike miracles, whose evidential power weakens over time, the study of creation only strengthens over time.

Glanvill's warning of our ignorance of the "Extent and Bounds" of nature (as an argument against the Enthusiasts) also proved to be a durable substrate for nineteenth-century intellectual necessity. John Stuart Mill pointed out that "nothing can ever prove that [a purported miracle] is a miracle: there is still another possible hypothesis, that of its being the result of some unknown natural cause" (Gillespie 1979, 150). Similarly, Thomas H. Huxley insisted that "[w]e can never be in a position to set bounds to the possibilities of nature" (Gillespie 1979, 149), for "the day-fly has better grounds for calling a thunderstorm supernatural, than has a man, with his experience of an infinitesimal fraction of duration, to say that the most astonishing event that can be imagined is beyond the scope of natural causes" (Mullin 2003, 209). Likewise, John Tyndall, in the prayer-gauge debate, argued that inferences of a miracle were invalid given that our knowledge of the intricacies of nature was constantly expanding (Mullin 2003, 209). Oxford professor and Anglican priest Baden Powell (1855, 354–55) insisted that "[n]o inductive inquirer can bring himself to believe in the existence of any real hiatus in the continuity of physical laws in past eras." Instead, science must view changes, however seemingly abrupt, as having been brought about by the gradual agency of some regular causes. To deny such principles "in any instance would be to endanger all science" (Powell 1855, 354–55).

The ever-increasing conviction was that science ought to restrict itself to naturalistic explanations, whether because of our limited knowledge of nature or, more importantly, in order to find truth, or even for the very survival of science. In any case, miracles not only could but must be excluded from science, as Darwin did in *On the Origin of Species*. This cessationist sentiment was evident in his discussion of the geographic distribution of species, for example, where Darwin (1872, 320) admitted that his view undoubtedly had "many cases of extreme difficulty," yet "[h]e who rejects it, rejects the *vera causa* of ordinary generation with subsequent migration, and calls in the agency of a miracle." Similarly, though certain supernatural, nonutilitarian views "if true, would be absolutely fatal to my theory" (Darwin 1872, 160), they could be safely discarded as "beyond the scope of scientific discussion" (Darwin 1872, 159).

Later in the decade, botanist Karl von Nägeli explained that "everything can be explained in a natural way," and George Romanes declared that "the knowledge that a Deity is superfluous as an explanation of anything . . . is grounded on an a priori necessity of reason—i.e., if the fact were not so, our science, our thought, our very existence itself, would be scientifically impossible" (Gillespie 1979, 151). Tyndall explained that "Science demands the radical extirpation of caprice and the absolute reliance upon law in nature" (Gillespie 1979, 151), and at the University of California, Joseph Le Conte (1891, 65–66) wrote:

The origins of new phenomena are often obscure, even inexplicable, but we never think to doubt that they have a natural cause; for so to doubt is to doubt the validity of reason, and the rational constitution of Nature. So also, the

origins of new organic forms may be obscure or even inexplicable, but we ought not on that account to doubt that they had a natural cause, and came by a natural process; for so to doubt is also to doubt the validity of reason, and the rational constitution of organic Nature.

This nineteenth-century insistence that science is critically dependent on strictly naturalistic explanations did not wane in the twentieth century. The French Jesuit paleontologist and philosopher Pierre Teilhard de Chardin (1881–1955) described Darwin’s theory of evolution as no mere theory or hypothesis but “a general postulate to which all theories, all hypotheses, all systems must henceforward bow and which they must satisfy in order to be thinkable and true” (Dobzhansky 1962, 347).

More recently, Bruce Alberts (2005), then president of National Academy of Sciences, explained that although our knowledge of evolution is incomplete and has many gaps, “the entire success of the scientific enterprise has depended on an insistence that these gaps be filled by natural explanations.”

My second example is the guilt-by-association argument for cessationism and a parallel in origin studies, *infra dignitatem*. As discussed, the guilt-by-association argument cast miracles as a lowbrow affair, needed to firm up the faith of the illiterate but beneath those of means. Similarly, the *infra dignitatem* argument cast nature’s lowly things as beneath God’s dignity (Hunter 2022). It traces back at least to seventeenth-century Anglican Ralph Cudworth, who wrote that it would be unbecoming of God to “Form the Body of every Gnat and Fly, Insect and Mite” with his own hands (Allen 2013, 341).

Following Cudworth, the botanist John Ray (1735, Part I, 51), for many the father of British natural theology, believed that God would not “set his own hand as it were to every work, and immediately do all the meanest and trifling’st things himself drudgingly.” Similarly, George Louis Comte de Buffon opposed the “indignity of involving God in trivial anatomical details” (Burbridge 1998, 57). Likewise, Darwin (1838, 36–37) expressed the *infra dignitatem* argument to himself:

How far grander than idea from cramped imagination that God created . . . a long succession of vile molluscous animals. How beneath the dignity of him, who is supposed to have said let there be light & there was light.—whom it has been declared “he said let there be light & there was light”—bad taste.

Darwin (1909, 254) again used the *infra dignitatem* argument in his 1844 essay:

It is derogatory that the Creator of countless Universes should have made by individual acts of His will the myriads of creeping parasites and worms, which since the earliest dawn of life have swarmed over the land and in the depths of the ocean.

In that same year, the *infra dignitatem* argument was made by Robert Chambers in his popular and controversial 1844 pseudonymous work *Vestiges of the Natural History of Creation*:

How can we suppose an immediate exertion of this creative power at one time to produce the zoophytes, another time to add a few marine mollusks, another to bring in one or two crustacea, again to crustaceous fishes, again perfect fishes, and so on to the end. This would surely be to take a very mean view of the Creative Power. (Bosanquet 1845, 20)

Though lacking a detailed theory of biological evolution, *Vestiges* played a significant role in the cultural uptake of evolutionary ideas in mid-century Britain. One enthusiastic reader was evolution co-founder, Alfred Russell Wallace (1898, 138):

I well remember the excitement caused by the publication of the *Vestiges* and the eagerness and delight with which I read it. Although I saw that it really offered no explanation of the process of change of species, yet the view that change was effected, not through any unimaginable process, but through the known laws of reproduction, commended itself to me as perfectly satisfactory, and as the first steps towards a more complete and explanatory theory.

For readers such as Wallace, *Vestiges* was exciting despite the fact that it did not offer a convincing or compelling theory of origins. It merely needed to offer a lawlike narrative, however incomplete. In 1867, Wallace (1867, 474) wrote his own version of the *infra dignitatem* argument:

Is it not then an extraordinary idea to imagine the Creator of the Universe contriving the various complicated parts of these flowers as a mechanic might contrive an ingenious toy or a difficult puzzle? Is it not a more worthy conception that they are some of the results of those general laws which were so co-ordinated at the first introduction of life upon the earth as to result necessarily in the utmost possible development of varied forms?

God would not be involved in the particular, peculiar details of nature, and that included the geographical distribution of the species. As Darwin (1859, 478) argued in *On the Origin of Species*: “[T]he presence of peculiar species of bats, and the absence of all other mammals, on oceanic islands, are utterly inexplicable on the theory of independent acts of creation.” A year later, Darwin made a *reductio ad absurdum* argument in a letter to Asa Gray. Do you believe, Darwin asked, “that when a swallow snaps up a gnat that God designed that that particular swallow should snap up that particular gnat at that particular instant?” If not—and the same logic applied to man—then why believe “that

their first birth or production should be necessarily designed”? (Gould 1999, 203). God would be no more involved in the creation of the species than he would be in their death.

By the twentieth century, the point had become moot and needed only a rhetorical reminder. Geneticist and leading evolutionist J. B. S. Haldane pointed out that the creator must have had an inordinate fondness for beetles to have created over 250,000 different species (Berra 1990, 142). Theodosius Dobzhansky (1973, 127) asked, “Was the Creator in a jocular mood when he made *Psilopa petrolei* for California oil-fields and species of *Drosophila* to live exclusively on some body parts of certain land crabs on only certain islands in the Caribbean?” Douglas Futuyma (1983, 127) rhetorically asked, “What could have possessed the Creator to bestow two horns on the African rhinoceroses and only one on the Indian species?” Regarding the elephant-like fossil species, Ken Miller (1999, 97) stated that “[t]his designer has been busy! And what a stickler for repetitive work!” While the metaphysics are obvious here, they can be dropped altogether for a brute evidential claim, as in this example from the National Academy of Sciences (1999, 15):

One species of a fungus (*Laboulbenia*) grows exclusively on the rear portion of the covering wings of a single species of beetle (*Aphaenops cronei*) found only in some caves of southern France. The larvae of the fly *Drosophila carcinophila* can develop only in specialized grooves beneath the flaps of the third pair of oral appendages of a land crab that is found only on certain Caribbean islands. How can we make intelligible the colossal diversity of living beings and the existence of such extraordinary, seemingly whimsical creatures as the fungus, beetle, and fly described above?

The underlying theological substrate was now gone altogether, and observations such as “colossal diversity” and “extraordinary, seemingly whimsical creatures” were brute confirmations of evolution.

My third example is cessationism’s divine parsimony argument and a parallel sentiment in origins discourse, greater god theology. As I described earlier, divine parsimony—the notion that God does not perform superfluous or redundant acts—traces back at least to Aquinas and Gregory the Great. In the seventeenth century, it was elaborated on by the likes of Tillotson and Stillingfleet. “The wise God,” Tillotson argued, “who is never wanting in what is necessary, does not use to be lavish in that which is superfluous” (Daston 1991, 114–15). In this sense, it was the better God who economized and used special divine action only where required.

Similarly, in origins studies, greater god theology held that it was the greater god who was economical in the use of miracles in the creation acts (Hunter 2022). In the seventeenth century, this was argued by both Nicolas Malebranche (1638–1715) and Thomas Burnet (c.1635–1715), though in very different

contexts—theodicy for Malebranche and cosmogony for Burnet. Malebranche's argument for the existence of natural evil was that while God could have created a world with less of it, that would have required additional miracles, targeted at specialized, particular problems of creation. Instead, God valued parsimony in the creation acts and the use of universal natural law. It was a divine trade-off between evil versus parsimony, and the result for Malebranche was an emphasis on the role of natural law in the origin of the world (Black 1997, 28). Burnet was at the pinnacle of the cosmogony tradition in seventeenth-century England, explaining the origin of the world. He employed the oft-used clock analogy, but in this case to illustrate the greater god theology: "We think him a better Artist that makes a Clock that strikes regularly at every Hour from the Springs and Wheels which he puts in the Work, than he that hath so made his Clock that he must put his finger to it every Hour to make it strike" (Burnet 1719, 146).

The greater clockmaker is more parsimonious, making a clock that works automatically. So too the greater god is the god who makes a universe that works by itself, according to natural law, rather than requiring divine intervention. This was in contrast to Isaac Newton's suggestion that the creator may occasionally intervene in the cosmos to correct for anomalies predicted by his new physics (Burt 1954, 296ff). Newton's suggestion inspired the similar complaint that miracles, in addition to violating parsimony, revealed an unskilled, tinkered creator who needed to intervene in creation "to mend his work and to set it right," as Leibniz put it (Danielson 2000, 245). Leibniz was a devout Lutheran, and he accused Newton of disrespect for God in proposing the idea that God was not sufficiently skilled to create a self-sufficient clockwork universe (Brush 1996, 17). For Leibniz, "when God works miracles, he does not do it in order to supply the wants of nature but those of grace" (Danielson 2000, 246). Again, as with Malebranche and Burnet, Leibniz reveals not an opposition to miracles *per se* but rather, as with the divine parsimony sentiment, restrictions on the purposes and types of miracles that are allowed. Unless these conditions are met, God would not work a miracle.

After Leibniz, Lutheran philosopher Christian Wolff elaborated on greater god theology, arguing that after the initial creation of the universe, any subsequent miracle would indicate that there was a blemish that needed removal. This, in turn, reveals a lack of wisdom. Creating the universe without such blemishes, and therefore no need for miracles, requires a greater god. Thus, Wolff reasoned that God would not use miracles except when natural processes were insufficient, and that occurs only at the initial creation *ex nihilo*. Wolff concluded that miracles cannot occur except at the initial creation event. From then on, natural law must have reigned (Saine 1987, 110–11). At the close of the century, Darwin's grandfather Erasmus celebrated this doctrine. He found Hume's idea that the world might have been generated rather than created, gradually produced from very small beginnings by its inherent principles, to be indicative of "a greater infinity" (Darwin 1794, 509).

What a magnificent idea of the infinite power of the great architect! The Cause of Causes! Parent of Parents! Ens Entium! For if we may compare infinities, it would seem to require a greater infinity of power to cause the causes of effects, than to cause the effects themselves. (Darwin 1794, 509)

In the nineteenth century, this sentiment was increasingly internalized. As Adrian Desmond and James Moore (1991) put it, the “lawful” approach was carrying the day. For example, Charles Babbage, reformer, polymath, and creator of the “Difference Engine,” wrote the unauthorized Ninth Bridgewater Treatise, countering the authorized volumes, which critics such as Babbage saw as suggesting a creator with both a lack of foresight and a lack of dignity. In Babbage’s narrative, God created the laws that created the species, thus displaying “a degree of power and of knowledge of a far higher order” (Desmond and Moore 1991, 213). Charles Lyell agreed and saw Babbage’s “estimate of the Creator’s attributes much higher” than those proposing an interventionist Creator (Desmond and Moore 1991, 214). Darwin also appealed to divine parsimony in notes to himself. For example:

Astronomers might formerly have said that God ordered each planet to move in its particular destiny. In same manner God orders each animal created with certain form in certain country, but how much more simple and sublime powers let attraction act according to certain law such are inevitable consequences. Let animals be created, then by the fixed laws of generation, such will be their successors. (Darwin 1960, 263)

In a later entry, Darwin made a Leibnitzian comment that “we profane” in thinking that God’s magnificent laws are not capable of “produc[ing] every effect, of every kind which surrounds us” (Cornell 1987, 390).

So, it is not too surprising that Darwin’s new theory of evolution would be approved on the basis of greater god theology. One of Darwin’s early clerical supporters, the Anglican Charles Kingsley, wrote that “We knew of old that God was so wise that He could make all things but behold, He is so much wiser than even that, that He can make all things make themselves” (Murphy 2003, 119).

Conclusions

The post-Reformation rise of cessationism played an important role in bringing about a paradigm shift in how the natural relates to the supernatural. Not surprisingly, this paradigm shift impacted natural philosophy and the new science. As Heyd (1995, 5) puts it, the cessationist reaction to Enthusiasm is “a phenomenon in the history of science no less than in Church history.”

This article has explored the influences of this shift on the origins science and, in particular, on the emergence of modern evolutionary thought. The

cessationism and miracle skepticism paradigm shift resulted in a deep and broad sea change in theological attitudes regarding miracles. These new attitudes could serve as substrates upon which to build arguments for evolution. This article suggests three such parallel relationships, as summarized in Table 1.

Cessationist substrate	Parallel evolution tradition
Natural philosophy. The new science was recruited and formulated to be an antidote to Enthusiasm by restricting science to naturalism.	Intellectual necessity. Science must be strictly limited to natural law and processes because this is required for science to succeed.
Guilt by association. Miracles were denigrated as a lowbrow affair, needed to bolster the faith of the uneducated and, in some cases, even contrived for their benefit.	<i>Infra dignitatem</i> . Direct creation of the lowly things of the world is beneath God’s dignity. Instead, they arose by lower means.
Divine parsimony. God economically uses miracles only where they are required, and not more. Miracles were required when first introducing new doctrine but once established, miracles would be redundant and superfluous.	Greater god. The economic creation by natural laws requires greater wisdom and power than creation by miracle. God used miracles to create the world initially, but thereafter the greater god creates in a strictly lawlike fashion.

Table 1. Three theological mandates for evolutionary theory that parallel earlier cessationist substrates.

As this article has shown, both the cessationist substrates and the evolution traditions listed in Table 1 have been pervasive and robust in the literature, including contemporary literature. Therefore, while commentators have noted robust metaphysical traditions in the evolution literature (Hunter 2021), this article demonstrates how some of these traditions are an echo of earlier, historical theological underpinnings motivated by the doctrine of cessationism.

Competing Interests

The author declares that they have no competing interests.

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The Value of Creation: An Interdisciplinary Analysis of Biblical Intrinsic Value

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This article investigates a biblical view on the value of creation. In addressing this question, it critically engages with environmental philosophers, especially John Baird Callicott and Holmes Rolston III, on topics related to the ontology of value. This article develops an independent biblical value theory in dialogue with contemporary environmental philosophy. Employing ecotheological hermeneutics, the article analyzes a range of biblical excerpts to discern a coherent biblical value theory in relation to counterpart secular value theories of anthropocentrism and ecocentrism. It concludes that the Bible accords with a theocentric, objective, nonhierarchical, intrinsic final value theory, or in other words, that the intrinsic value is dependent on God, is real, does not differ in quantity, and is not reliant on a specific property.



Introduction

For several decades, the question of intrinsic value in nature has been at the forefront of environmental philosophy, even serving as the basis for a uniquely environmental ethic (Regan 1981, 23). There is a growing consensus that nature has intrinsic value, that is, value in itself. David G. Horrell (2010, 130) ties the concept of intrinsic value to biblical texts (though under the name “the goodness of all creation”). It has become commonplace to refer to the intrinsic value of the nonhuman parts of creation, as exemplified by numerous such occurrences in the recent *Oxford Handbook of the Bible and Ecology* (Bernstein 2022, 207; Braaten 2022, 155; Schifferdecker 2022, 188; Watson 2022, 332).

Environmental philosopher John Baird Callicott examined various arguments for intrinsic value in nature. Callicott (1986, 162–63) was most convinced by the bio-empathy theory of intrinsic value, claiming that this scientifically inspired axiology was coherent, defensible, and convincing. The runner-up was the biblical J-Theism theory, which Callicott claims is overall effective and defensible. Callicott thus firmly places the Bible in the scope of contemporary environmental philosophy, but he also narrows the biblical account of intrinsic value for nature to a portion of Genesis. As it stands, a comprehensive study analyzing the philosophical content on intrinsic value in the Bible is lacking, which this article will contribute towards.

Though theology of nature has sometimes incorporated the axiological concept of intrinsic value, the content of the concept remains unclear. To elucidate this, I will utilize philosophy and ethics to clarify the meaning of biblical intrinsic value. Specifically, this article asks: What kind of intrinsic value of nature can be discerned from the Bible?

The leading question breaks down into four main sections, each led by a question probing the concept of intrinsic value. First, is the concept of intrinsic value anthropocentric or theocentric? Second, is it ascribed by humans (subjective) or innately present in the entity (objective)? Third, is it hierarchical or egalitarian? Fourth, is it supervening on a property in the entity or is it a kind of final value?

Before delving into biblical intrinsic value, three concepts call for elucidation: intrinsic value, nature, and anthropocentrism. Intrinsic value is often defined over against instrumental value. These terms are commonly and most clearly defined in a Kantian fashion, which assigns instrumental value to something that serves as a means to an end, whereas something has intrinsic value if it is an end in itself (Afeissa 2009, 529; Francuz 2020, 57–58; Rolston 1988, 186). Intrinsic value is understood as something that is valuable without necessarily being useful for any purpose. It should be noted that instrumental and intrinsic value are not mutually exclusive. An entity can hold both instrumental and intrinsic value simultaneously; for example, a tree may have intrinsic value as part of nature while also providing instrumental value as a source of oxygen and shelter for animals. For a comprehensive overview of contemporary positions of intrinsic value in nature, see Benjamin Steyn (2024).

But what is nature? By nature, I refer to the nonhuman-processed parts of the Earth, encompassing both the biotic and abiotic world. This divides nature from culture with its human-made objects, following theologian Gordon Dester Kaufman (1972, 342), but does include that which is affected and modified by humans, such as crops, forests, and mountains. It should be specified that this definition goes against certain trends of including human-made objects in nature, in short, merging nature and culture (such as Santmire 1985, 12; see also Latour 2017). In my view, H. Paul Santmire's broad definition has the weakness of including too much in nature, not being able to distinguish, for example, weapons from wilderness.

Finally, three aspects of anthropocentrism can be uncovered. Scholar Patrick Curry (2006, 43) describes anthropocentrism as the belief that "humanity is the principal or sole thing of value, and that the only appropriate or possible scale of value for humans is a scale of human values." Implicit in this definition is an ascription of intrinsic value to humans and non-intrinsic value to nonhumans, for example, an economic value to certain minerals that are instrumentally valuable to humans. It also follows that only humans have moral standing and deserve ethical consideration for their own sake. Philosopher Allan Thompson (2017, 78) describes this type of anthropocentrism as ethical anthropocentrism, meaning that humans have moral superiority over the rest of the world. Ethical anthropocentrism is frequently coupled with ontological anthropocentrism, which holds that humans have a superior position in the world, being placed above everything else either by merit or divine decree (Thompson 2017, 78). A third type, coined conceptual anthropocentrism, claims that our human outlook on the world is the only one accessible to us, therefore, whatever position we deem plausible is necessarily of human origin (Thompson 2017, 79). I will return to conceptual anthropocentrism later.

Now that intrinsic value, nature, and anthropocentrism are defined, the biblical methodology of ecotheological hermeneutics will be employed. Following the methodology, four main sections on intrinsic value will successively build the biblical value theory that this article argues for. Each section is led by a biblical excerpt, respectively: Genesis 1:28 and Genesis 9:8–11; Job 38:25–27, 41; Psalm 148:1–13; Romans 8:19–22; and finally, Genesis 1:31. All quotes from the Bible are from the New King James Version. Finally, this article concludes with an expanded biblical value theory—a theocentric, objective, egalitarian, final intrinsic value theory.

Ecotheological Hermeneutics

Ecotheological hermeneutics emerged at the turn of the millennium as a critical method for uncovering new ecological dimensions in scripture, spearheaded by Santmire's (2000, 6–8) three interpretive approaches: reconstructive (see Habel 2000), apologetic (see Moo and Moo 2018), and revisionist—my preferred

approach due to its scriptural authority (see Sittler 1962; Horrell, Hunt, and Southgate 2008).

The revisionists, writes Santmire (2000, 8), “have given the highest priority to biblical interpretation.” Unlike the reconstructionists, the revisionists respect the authority of the Bible but admit that it must be interpreted, both in light of and against the tradition of biblical interpretation. On account of this trait, they are also described as reformers (Santmire 2000, 8). I prefer the name “reformers” for this group instead of the ambiguous name “revisionists,” which can be understood as either revising the Bible or revising tradition (though the latter is meant). “Reformers” are rather looking at the Bible in a new time and using it as the norm to inspire new positions for contemporary problems. In relation to creation, one may say that the Bible does not need to be saved from being branded as fronting a harmful environmental position but that the Bible needs to reform our current stance on problems that have caused the environmental crisis. For the Bible to do this, it needs to be read with a careful sensitivity to its implications about contemporary environmental issues.

What may such a reformative approach constitute? The sober and critical account by David G. Horrell, Cherryl Hunt, and Christopher Southgate (2008, 233) paves the way for the development of what they call “an ecological hermeneutic.” There are two main points I will incorporate into my version of the reformative approach to reading the Bible: (1) promoting a circular hermeneutic, and 2) establishing the importance of an informed and interdisciplinary venture (Horrell, Hunt, and Southgate 2008, 233–37).

The first, promoting a circular—or reflexive—hermeneutic, is important. In a reformative approach, there exists a close relationship between what is sought to be reformed (our interpretation of the Bible) and the impulses from contemporary situations that inspire the demand for reformation. Horrell, Hunt, and Southgate (2008, 235) mention Martin Luther’s discovery of the lens of “justification by faith alone,” which was inspired by the religious climate of his time and then reformed how he read the entire Bible. Similarly for the present article, an ecotheological hermeneutic is employed on the Bible, which involves applying a lens of intrinsic value in creation to interpretation of scripture. While the inspiration for these lenses stems from contemporary issues, the hermeneutics would not be circular if they had no counterparts in the Bible itself. Both contemporary issues as well as the Bible work together to inspire lenses to interpret with, in order to reform tradition and our paradigmatic knowledge and beliefs. Theologian Peter Manley Scott (2010, 432) identifies this double hermeneutic as the “dialectic of engagement” through theological engagement with ecology and the “dialectic of repair” through repairing Christian tradition in light of interdisciplinary engagement. This follows Horrell’s (2010, 9) quest to develop and employ an ecological hermeneutic—a reorientation of reading the Bible with an ecological sensitivity called for by current environmental issues.

It is my task, then, to discern the philosophical details of this lens of intrinsic value that is frequently employed in contemporary environmentally oriented theology. This approach, however, does not employ eisegesis by reading an intrinsic value of nature into the biblical texts; rather, it sheds light on texts that support the finding of such a concept in the Bible.

Second, theology has never been purely an a priori undertaking, and theology of nature is no different. The Bible and the contemporary situation ought to be in dialogue to secure a fruitful ecological hermeneutic (Horrell, Hunt, and Southgate 2008, 237; van den Brom 1997, 299). Theologian Jan-Olav Henriksen (2022, 3) claims that for the Christian tradition to be contemporarily relevant, interdisciplinary work is necessary. One particular strength of working across these two fields is that environmental philosophy is by nature interdisciplinary. Its focus lies on the empirical environment, which it shares with other hard sciences such as ecology. For the very same reasons, theology of nature benefits from working in an interdisciplinary manner with an informed view from the natural sciences as well as environmental philosophy and its expertise on axiology.

While the hard facts of the environment are helpful in order to do environmental philosophy, they are not exhaustive. To quote Holmes Rolston III (1996, 20): “There really is no scientific guidance of life.” When it comes to discussing the value of nature, environmental ethics may benefit from working with theology, which has dealt with the status of nature and the world since its genesis. Likewise, theology of nature can benefit from tapping into environmental ethics to better map the content of the popularized concept of intrinsic value.

Intrinsic Value: Anthropocentrism or Theocentrism?

Traditionally, the story of humanity has been at the fore of history, while the story of nonhuman creation has largely been ignored (Habel 2001, 24). This led to an anthropocentric outlook, that is, holding humanity as the sole or highest value within creation (Curry 2006, 43). Anthropocentrism has recently been challenged by theocentrism, where God is the warden of value. In short, a theocentric value theory holds God as the creator and granter of intrinsic value. The origin of intrinsic value affects its ontological character and thus serves as a vital component of any value theory. This article deals with the subject of biblical dominion before considering arguments for anthropocentrism and its favored model, stewardship, and then finally exploring a path to theocentrism through a key covenantal biblical text.

Anthropocentrism

For better or worse, perhaps the single most influential biblical verse on environmental matters stems from the creation story in Genesis 1. God has created the cosmos, the Earth, and all its creatures. God’s human creatures

received specific instructions on how to behave in the world: “Then God blessed them, and God said to them, ‘Be fruitful and multiply; fill the earth and subdue it; have dominion over the fish of the sea, over the birds of the air, and over every living thing that moves on the earth’” (Genesis 1:28).

Humans are given two mandates regarding their relationship with the Earth. They are to be “fruitful and multiply” as well as to “fill the earth and subdue” it (Genesis 1:28). Prior to the creation of humans, both sea creatures and birds are also told to be fruitful and multiply (Genesis 1:22), and as Noah’s ark returns to dry land, every living thing is told to “be fruitful and multiply on the earth” (Genesis 8:17). This commandment, then, is not to be heeded by humans alone, pointing to a valuing of life and biodiversity. The question remains how this abundance of life is to relate to the Earth being multiplied on.

In the Hebrew source text, we learn that man is commanded to “subdue” (*kabash*) the Earth. This particular word is usually understood as a forceful takeover, a subjugation (Twardziłowski 2020, 17). Such an understanding comes from the primary meaning of the word, namely, “to tread with the feet” or “to trample under feet” (Gesenius 1979, 383; כָּבַשׁ). Reframing the perspective away from hostility and instead emphasizing the connection between humanity and nature, this mandate can be taken to imply the cooperation of humans and the Earth through the process of cultivation. Scholar of religious studies Lloyd H. Steffen (1992, 72) interprets *kabash* as an action word, discerning the meaning in relation to how Adam must act towards the Earth that is to be subdued. This strategy mirrors contemporary Jewish scholars, who have interpreted Genesis 1:28 in light of Genesis 2:15, where man is put to “tend and keep” the garden of Eden (Belser 2022, 359). Steffen (1992, 72) finds that the mandate given to Adam in Genesis 2:15 leads to understanding *kabash* as an agrarian mandate.

Old Testament scholar Terence E. Fretheim (2015, 199) shares this view and points to the “creational development” embedded in this command. The cooperation of continual creation resonates with Genesis 2, for without man to till—as well as rain to water—plants and herbs cannot grow (Genesis 2:5). Continual creation is a project where God, humans, and nature all play their parts, and the latter two require each other for food and flourishing. This, however, leaves room for error and disturbances, as when man mistreats the Earth (e.g., Ezekiel 36:17). Later in the biblical story, we see that the Earth is both cursed and wronged, and that God gives the land of Israel promises of restoration to paradise, where it shall once again be tilled and sown (Ezekiel 36:9). All in all, the command to subdue the Earth can reasonably be interpreted as a blessing rather than a sentence of hardship. The immediate context of this command may prove enlightening; the command is placed next to man’s dominion over the animals, which I now turn to.

The mandate of humanity's dominion over the animals is a primary reference when discussing maltreatment of nature, from broad academic circles to *Time* magazine (McHarg 1968, 213; Sancton 1989, 9). I do not doubt the accuracy of such sources' criticism of certain interpretations of Genesis 1:28, but I aim to show that this reading of devaluing creation through dominion is not a compelling one.

It is difficult to perform a rereading of Genesis 1:28 when what is seen contemporarily can also be diagnosed with the same phrase, that "humans have dominion over the animals." But what are the odds that the present-day understanding of dominion as mass production of animals for human food and hunting for the sport of it is the same as the biblical ideal of dominion? Henriksen (2003, 140) points out that what led to our present-day dominion is an inheritance from Renaissance thought. In the context of Eden, the violence and death that characterize modern day dominion were not yet introduced. The animals were not originally intended as food (Genesis 1:29), so what could dominion have consisted of?

There have been tendencies to interpret the mandate of dominion in a more positive light. Some scholars trace the word to the political sphere, claiming that mankind ought to act as a benevolent king above the rest of creation (Limburg 1991, 126). Others use the analogy of man being a shepherd that ought to look after his flock with care (Brueggemann 1982, 32). This may be partly right, but it paves the way for paternalistic stewardship that treats nature as "subjects" to be taxed just enough to not revolt. That is, let mankind be stewards of the Earth to extract its "resources" in a supposedly sustainable manner. As early as the 1910s, horticulturist Liberty Hyde Bailey (1915, 14) called for a recalibration of the mandate of dominion: "We shall put our dominion into the realm of morals. It is now in the realm of trade." Is it possible to avoid paternalistic or economic readings of dominion?

The dominion debate is complex, and I do not aim to settle it once and for all in this article. I believe, however, that considering the context of the mandate of dominion will at the very least set the scene of how dominion ought to be understood. As noted, the biblical context of Genesis is vastly different from that of contemporary societies. Steffen (1992, 66) argues that the context is one of peace: "In Genesis, dominion is thoroughly compatible with a peaceful setting—the Garden." Steffen further claims that human relations with God as well as nature at the time were better described as intimate rather than estranged. However dominion is to be interpreted then, it ought to be with the context of the pre-Fall setting in mind. Steffen (1992, 72) contrasts this understanding of dominion with *domination*, which is the sinful version of a twisted dominion. This aligns with a reading of dominion as a mandate for humans to care and serve (mirroring Genesis 2:15) and to increase healthy participation with both God and creation (Yeoman 2020, 47). The peaceful

setting of the garden, however, was cut short by the Fall. The worldly setting drastically changed. I now turn to God's attempt to remedy the situation by establishing a covenant.

The aftermath of the Fall was imbued with violence and corruption. The world had lost its initial purity, and humanity's knowledge of good and evil proved inadequate for humans to choose the former. Though it was human beings' moral decay that drove God to regret his creation (Genesis 6:5–6), the animals were subjected to the same fate as humans. Save the passengers of the ark—Noah's family and animals of each species (Genesis 6:18–19)—the world was to suffer death by deluge. After the great flood had cleansed the Earth of living creatures (Genesis 7), God once again provided dry land for a new beginning. Though humans' evil intent remained, God promised not to destroy every living thing again (Genesis 8:21). This promise safeguarding against a new flood is embedded in a covenant God enters into with Noah, his descendants, and every living creature that came out of the ark:

Then God spoke to Noah and to his sons with him, saying: "And as for Me, behold, I establish My covenant with you and with your descendants after you, and with every living creature that is with you: the birds, the cattle, and every beast of the earth with you, of all that go out of the ark, every beast of the earth. Thus I establish My covenant with you: Never again shall all flesh be cut off by the waters of the flood; never again shall there be a flood to destroy the earth." (Genesis 9:8–11)

The significance of this inclusive covenant has been interpreted in various ways. One popular strand of green Christianity has taken this covenant as a key text for a proper understanding of the stewardship model (McDonagh 1986, 123). The stewardship model was once Callicott's preferred environmental ethic for believers (1999, 193–94), and for better or worse, the model has had consistent backing from lay people and church leaders for several decades.

John Arthur Passmore defended the stewardship model as early as 1974. While admitting the model was not overly biblical, instead tracing its roots to "post-Platonic philosophers of the Roman Empire," Passmore (1974, 28) held that man ought to act as a steward, as God's deputy in the world. The biblical basis for promoting the stewardship model is traced to Genesis 1:28, where the commands to subdue the Earth and have dominion over the animals stem from (McDonagh 1986, 121).

The stewardship model tends to emphasize restrictions on the human mandate to dominion. Ecotheologian Sean McDonagh (1986, 122) specifies that the instructions given to man in Genesis are not a "licence for humans to do what they like with the Earth." Instead, humans are invited to act as

“viceroys of God” in relation to nature, which should unite human beings and nature in harmony and safeguard against exploitation (McDonagh 1986, 122).

Unlike McDonagh, Passmore is willing to get his hands dirty and has a different harmonization in mind regarding human–nature relations. Drawing on philosopher Herbert Marcuse, Passmore (1974, 35) introduces two types of mastery over nature: repression and liberation, arguing that the former is necessary for achieving the latter. On this account, a sort of taming of nature is needed, as opposed to leaving it be wild, a view Passmore (1974, 38) denotes as primitive. From Marcuse, Passmore (1974, 35) draws the conclusion that the ideal treatment of nature is neither to destroy it nor to leave it be but rather to humanize it. Claiming to be in the middle of two extreme points, Passmore (1974, 38) argues for a “doctrine that it is man’s task to perfect nature by designing *with* it.” On the basis of humanity’s superior role in the stewardship model, it can rightly be classified as ontological anthropocentrism (see Thompson 2017, 78). As a biblically—or rather, Genesis 1:28—based model, it has a Christian character.

The underlying critique of the stewardship model is that it is inherently anthropocentric. What is the core issue with an anthropocentric position? Many answers are possible, but here I maintain that it goes against a biblical view of what the world revolves around. Contrary to an anthropocentric reading of the covenant of Genesis 9 as supporting human stewardship (McDonagh 1986, 123), I point to the text’s egalitarian character. When God gave his promise to all living creatures to not let them succumb to a flood again, he sealed the promise with a covenant. That the covenant was made by God with both humans and “the birds, the cattle, and every beast of the earth with you” (Genesis 9:10) does more than merely point out that every living creature deserves care. The covenant also effectively holds every living creature to be of such a kind that God himself enters into a covenant with them (Genesis 9:10). God’s use of covenantal language with all living creatures challenges anthropocentric ideas that only humans possess intrinsic value or deserve moral consideration. Contrary to an anthropocentric view, the inclusiveness of the covenant in Genesis 9 puts, in this context, humans and the rest of the living creatures on equal footing.

According to the insights from the inclusive covenant of Genesis, ontological anthropocentrism does not accord with a biblical view. Further, if the covenant is any indication of intrinsic value, an anthropocentric position fails to consider the consequences of a cosmic covenant. However, it is neither humanity nor the rest of nature that initiates the covenant; rather, it revolves around God. This key insight implores us to look towards theocentrism as an outlook more in accordance with the Bible and consider whether it is suited to account for

the intrinsic value of creation in line with a cosmic covenant and thus move beyond anthropocentrism.

Theocentrism

Traditionally, the book of Job has been interpreted as a text on human suffering and the problem of evil. However, ecotheological scholarship has emphasized Job's depiction of creation, particularly in the whirlwind speeches (from Job 38:1), wherein God reveals the breadth of his creation beyond human affairs. God is concerned with water and thunder having suitable trajectories in the world, revealing a strong abiotic focus. Towards the end of the chapter, the focus shifts from the abiotic to the biotic world, with God asking Job who provides food for the raven when their young ones are starved. As is implied, the answer is not Job but rather God. God is showing that the world does not revolve around Job; instead, it revolves around God. By implication, then, both animals and the abiotic world carry value regardless of their relation to human beings.

Who has divided a channel for the overflowing water, or a path for the thunderbolt, to cause it to rain on a land where there is no one, a wilderness in which there is no man; to satisfy the desolate waste, and cause to spring forth the growth of tender grass? (Job 38:25–27)

Who provides food for the raven, when its young ones cry to God, and wander about for lack of food? (Job 38:41)

The new ecological awareness has unearthed a novel dimension of the book of Job: its ecological wisdom. God's speeches from the whirlwind about creation, and how far-removed parts of it are from humans, serve as an antidote to anthropocentrism. With the whirlwind speeches, in environmentalist Bill McKibben's (2005, 32) words: "Our anthropocentric bias is swept away." God makes it clear that humanity is not the sustainer of the Earth, he is. Nowhere is this clearer than in the case of the Leviathan; God asks, "Can you draw out Leviathan with a hook, or snare his tongue with a line which you lower?" (Job 41:1). God knows humans stand no chance at subduing the sea creature: "Lay your hand on him; remember the battle—never do it again!" (Job 41:8). Finally, God puts humanity in its place: "Who has preceded Me, that I should pay him? Everything under heaven is Mine" (Job 41:11). God takes his rightful position as the Creator and Sustainer of the world and removes man from its centrum.

The key takeaway from the book of Job is that there are events in the world that are important without having any relation to humans. God makes the grass grow and feeds the birds, specifically where there are no humans. An early commentator on ecology and the book of Job, rabbi Robert Gordis (1985,

198), puts it thusly: “The universe is not anthropocentric, but theocentric, with purposes known only to God, and which man cannot fathom. Man is not the goal of creation and therefore not the master of the cosmos.” This statement specifically targets what I have referred to as ontological anthropocentrism (Thompson 2017, 78). Humanity is dethroned as the final end of the universe and especially as the ruler of it. The world, then, does not revolve around humanity; neither does it revolve around other parts of creation. It revolves around God. The world is theocentric, and thus God is the source and attributor of intrinsic value in nature.

However, seeing as a stewardship theory outsources God’s rulership to humanity, are there theocentric positions liable to anthropocentrism? I will show that not all types of theocentrism are non-anthropocentric, and then argue that the anthropocentric form of theocentrism is inadequate. Philosopher Garrett J. DeWeese argues for a theocentrism rooted in a stewardship model. DeWeese (2023, 6) explicitly claims that “[t]he concept of humans as stewards of creation, and hence over creation, is not an anthropocentric but a theocentric concept.” DeWeese wants to avoid anthropocentrism by claiming a theocentric position, but by rooting this move in stewardship, he commits to the very position he seeks to avoid. DeWeese cites relevant biblical texts and presents convincing arguments for theocentrism; however, he makes a mistake by making stewardship a component of his theocentrism. While DeWeese (2023, 5) admits that a theocentrism that acknowledges God as Creator of the world “could well be sufficient to ground an ethic of respect for nature,” he goes further and proposes a stewardship model of ethics. Why is that?

DeWeese has two reasons to adopt a stewardship model into his theocentrism. The first regards moral philosophy. DeWeese (2023, 5) admits to an interconnectedness between humans and the rest of creation, akin to what we have seen in ecology. Morally, DeWeese (2023, 5–6) argues that humanity is aligned with God, creating a gulf between humans and the rest of creation in terms of moral agency. It seems to me that DeWeese is creating gulfs where there need not be any. He is correct in assessing a difference in moral agency between humanity and the rest of creation, but this does not create a gulf large enough to put humans “over nature” (DeWeese 2023, 6). DeWeese (2023, 6) claims to front a view that does justice to humanity’s exclusiveness (in terms of reason and morality) and musters a sense of unity with other life forms. However, this is possible without committing to an anthropocentric position. Philosopher Arne Johan Vetlesen (2023, 183) argues that it is perfectly reasonable to maintain a division between moral agents and moral addressees; one can in fact maintain responsibility for moral agents without abandoning the other creatures that are moral addressees. Differences in capacities (such as reason or morality) do not automatically lead to questions of rulership or who stewards who; recognizing moral responsibility does not mean that part must paternalize the other.

The second reason DeWeese has for fronting anthropocentric theocentrism is biblically grounded. The relevant excerpt is from Psalm 8, an oft-cited anthropocentric creation text. Psalm 8 places man “a little lower than God [sometimes translated as ‘angels’]” and states that man is made a ruler over God’s handiwork; indeed, everything is under his feet. DeWeese (2023, 7) quotes approvingly an interpretation that holds Psalm 8 to front a biblically grounded stewardship ethic, exalting man to the role of vassal prince above the rest of creation.

If DeWeese aimed to establish a biblically grounded ethic, he ought to have considered a broader selection of scripture. Reading Psalm 8 as an anthropocentric text may just stem from an anthropocentric lens it is high time to put away. Author C. S. Lewis (1971, 111), in his reflections on the psalms, recognizes that Psalm 8 is more about Christ than about man qua humanity. Lewis rightly traces Psalm 8 to the epistles of the New Testament, where Paul in 1 Corinthians 15:20–28 clearly states that it is Christ who has everything under his feet—indeed it is He who reigns with power, not humanity in general. Further, in Hebrews 2:5–9, Psalm 8 is quoted directly, and the following interpretation is again Christocentric rather than anthropocentric: “But we see Jesus, who was made a little lower than the angels, for the suffering of death crowned with glory and honor, that He, by the grace of God, might taste death for everyone.” Instead of speaking of humanity’s glory, the New Testament authors interpret Psalm 8 as speaking of Jesus’s glory. There is no trace of the reading that humanity is put over nature in the interpretation of Psalm 8 in the New Testament. Besides this pressing argument, an anthropocentric reading of Psalm 8 does not resonate with the worldview found in the book of Job, where humanity is often on the sideline, being no steward of land and with creatures totally unavailable to us, such as the wasteland and Leviathan.

When God the Creator decided to imbue nature with intrinsic value, this did not automatically grant humanity stewardship over the valuable creatures. However, there is another way God may have outsourced intrinsic value to humanity, namely, by granting them the power to attribute subjective intrinsic value to the world.

Intrinsic Value: Subjective or Objective?

Beyond the topic of theocentrism, there remains a question regarding the origin of intrinsic value: Is value subjective (there for us) or objective (really there)? Callicott (1986) argues for a subjective position that holds nature (humans included) to be originally devoid of intrinsic value, but humans can attribute intrinsic value to the world. This position is called anthropogenic rather than anthropocentric, based on Callicott’s (1986, 142) claim that “the source of all value is human consciousness, but it by no means follows that the locus of all value is consciousness itself.” Although it is not ontological

nor ethical anthropocentrism, I identify it as a conceptual anthropocentrism as outlined earlier, following Thompson (2017, 79). The subjectivists (in addition to Callicott, see Curry 2006, 41–42, drawing on Wiggins 2000, 8, and for a Christian stewardship account, see Valera 2025, 138) argue that all theories of intrinsic value are subjective, due to our inevitable human outlook. I will show that this need not apply to a biblical, theocentric theory of intrinsic value, drawing on Psalm 148:1–13:

Praise the Lord! Praise the Lord from the heavens; praise Him in the heights! Praise Him, all His angels; praise Him, all His hosts! Praise Him, sun and moon; praise Him, all you stars of light! Praise Him, you heavens of heavens, and you waters above the heavens! Let them praise the name of the Lord, for He commanded and they were created. He also established them forever and ever; He made a decree which shall not pass away. Praise the Lord from the earth, you great sea creatures and all the depths; fire and hail, snow and clouds; stormy wind, fulfilling His word; mountains and all hills; fruitful trees and all cedars; beasts and all cattle; creeping things and flying fowl; kings of the earth and all peoples; princes and all judges of the earth; both young men and maidens; old men and children. Let them praise the name of the Lord, for His name alone is exalted; His glory is above the earth and heaven.

The psalmist calls all and everything to praise the Lord. From the heavens with its angels to the sun and moon, even the stars, from the Earth and all its inhabitants to the sea and its depths, even the elements of fire, air, earth, and wind; all that is alive, both animals and humans of all kinds, should give praise to the Lord. The psalmist implores creation with the use of the verb “praise” as imperative. The commands to praise, it should be noted, are not merely directed to the living creatures but also to the abiotic world. That creation is called to praise the Lord is not unique to the Psalms, nor even unique to the Old Testament (for the book of Revelation, see Bauckham 2011, 164; for the Gospel of Luke, see Horrell and Coad 2011). What is the significance of nature, not just humanity, being an agent of praise? The integral character of nature surfaces in Psalm 148, and in the following, I shall examine its importance to a subjective or objective understanding of intrinsic value.

Recognizing that all parts of creation “raise their voices” in praise of God is instrumental to challenging the anthropocentric status quo. Scientist–theologian Mark Harris, through an analysis of Psalm 19, considers the anthropomorphic language of creation’s praise in the Psalms. Harris argues that the text ought not to be read anthropocentrically by interpreting nature as a poetic model for human praise. Rather, Harris (2018, 294) understands nature’s praise as real and merely portrayed in anthropomorphic language for it to make sense for a human understanding. We do not know what it is like to be a bat, much less a

tree or a mountain, necessarily leading us to employ the language familiar to the human sphere. This hermeneutical move allows us to dig deeper into the text's meaning beyond its poetic form.

Theologian Richard Bauckham uses Psalm 148 to turn anthropocentrism on its head. Bauckham (2011, 154) notes that in the order of praises, humans are the last ones to join the choir, hence "it is much more obvious that other creatures can help us to worship God than that we can help other creatures to." Perhaps mirroring the order of their creation from Genesis 1, the abiotic world precedes the biotic world. This may have a very practical reason; it is hard to imagine life without ground to stand on or water to drink or live in. The abiotic world necessarily precedes the biotic world, both according to evolutionary theory and the biblical account. Thus, the abiotic world also precedes the biotic world in offering praise to their Creator. This aligns with Old Testament scholar Iain Provan's (2021) comparative analysis of anthropocentrism in Genesis and the Psalms, finding no basis for an anthropocentric religion in either book. Provan (2021, 108) further notes the precursor to the call of praise in Psalm 148, namely, that God intimately cares for creation in Psalm 147, mirroring the excerpt from Job 38 considered earlier. As the Psalms are identified to discourage an anthropocentric position, the question remains whether Psalm 148 supports a subjective or an objective value theory.

The founding father of environmental philosophy, Holmes Rolston III, challenges Callicott's subjective position. The major difference between Rolston and Callicott's objective and subjective theories of value, respectively, is that Rolston argues that humans *discover* value already present in nature, while Callicott asserts that humans *generate* value in nature. Callicott's anthropogenic view elevates humanity to a higher status than Psalm 148 does. The closest connection might be Fretheim's (1987, 29) observation that Psalm 148 implies a human worship leader calling to praise, making praise occur within a human context. However, as Fretheim (1987, 26) acknowledges, God directly calls on nonhuman creation on several occasions without the need for human intermediaries. The fact that God directly relates to nonhuman creation, and that the mountains and fire can praise God regardless of whether humans hear it or not, aligns with Rolston's objective theory of intrinsic value.

Fretheim (1987, 26) takes for granted that God observes intrinsic value in all creatures, indeed, independent of humans. This view is consistent with the independence of creatures like Leviathan and the desolate ground God waters for its own sake, as seen in Job 38. There is value in creation that is theoretically not reliant on intra-creation relationships—even though in practice these relationships are unavoidable. In other words, it is not an instrumental kind of value. This intrinsic value is an objective kind, hence why God *saw* that his creation was good (Genesis 1).

However, is value realism of this kind philosophically plausible? Lutheran theologian Christoph Schwöbel (2018, 58) recognizes this blur of ontological and ethical lines, commenting that God's observation of creation being very good "connects fact and value in such a way that questions of ethics cannot be a matter to be considered after the facts have been established." Is this connection of fact and value not a blatant transgression of David Hume's famous is–ought problem?

Rolston dispels the is–ought problem for environmental philosophy as what is recognized to be a category mistake. One may say that in traditional interhuman ethics, the worldview one holds (i.e., how the world *is*) does not necessarily translate to a definite plan of how the world ought to be (Rolston 1988, 230). However, this is not so for environmental ethics according to Rolston. Rolston (1988, 230) claims that in environmental ethics, "[o]ur model of reality implies a model of conduct." Rolston's model is an evolutionary type, where nature itself generates values through life-flourishing natural processes. In other words, value is part of what an entity *is*, and value carries with it a certain *ought*, though granted, admits Rolston (1988, 231), with the basic premise that values ought to be protected. This premise is held as fundamental, to the same extent as the premise to promote the good. Rolston (1988, 231) places this observation of values being generated and demanding an ethical response as part of metaecology, which is largely a consequence of his value realism. While Rolston operates within environmental ethics and the natural sciences, Hume was largely focused on human-to-human ethics, hence why Rolston dispels the charge of the is–ought problem as a category mistake. These fields have different premises, especially Rolston's interdisciplinary approach to environmental ethics.

The question remains whether Rolston's escape from the is–ought problem is unique to his evolutionary theory of environmental ethics or whether the solution has a broader applicability for a biblical value theory. Recall that Rolston holds the premise that values ought to be protected on par with the premise that the good ought to be pursued. I identify a similar premise in Genesis 1:31, wherein God sees that creation is very good, which I will return to later. There is an important distinction between God considering, evaluating, and regarding it as good and, as in fact the text reads, God *seeing* that it is good, because God created it good. God's seeing the goodness implies a value realism; the value is there to be discovered, not generated, by humans. The fact that God sees this goodness and takes care to protect it (Job 38) demands an *ought* from what *is* (it is good, therefore it is to be treated accordingly), akin to Rolston's argument. This shows that Rolston's circumvention of the is–ought problem is dependent on his value realism. Because values are real, and values are to be protected, one derives an *ought* from an *is*, or more specifically, they are discovered together

(Rolston 1988, 231). Thus, value realism is as valid for an ecocentric position as it is for a theocentric view of intrinsic value that sees an ontological goodness in creation deserving of consideration. Through both nature's praise of God in Psalm 148 and God's acknowledgment of intrinsic goodness in creation in Genesis 1, we find a value not projected nor generated by humanity but rather sustained objectively by God.

Intrinsic Value: Hierarchical or Egalitarian?

Though all creatures—biotic and abiotic—praise God and are imbued with intrinsic value, we may ask whether this value gives rise to a hierarchy or portions of value. Philosopher Sigurd Hverven (2023, 347–49) follows Rolston's critique of Callicott's subjective value theory. Hverven (2023, 350) recognizes the uniqueness of Rolston's theory, specifically its emphasis on the dynamics of nature; real value stems from independent activity, creativity, and autonomy in natural phenomena. While I agree with several points by Rolston and Hverven, I will challenge the idea that the origin of value stems from activities or projects in nature, which leads to a hierarchy of intrinsic value. This will be the first of two parts challenging these two philosophers, as the next section will deal with the specific type of intrinsic value Rolston and Hverven articulate.

In regard to identifying whether our value theory ought to be hierarchical or egalitarian, a central biblical excerpt portraying creation will guide us, namely, Romans 8:19–22:

For the earnest expectation of the creation eagerly waits for the revealing of the sons of God. For the creation was subjected to futility, not willingly, but because of Him who subjected it in hope; because the creation itself also will be delivered from the bondage of corruption into the glorious liberty of the children of God. For we know that the whole creation groans and labors with birth pangs together until now.

In Romans, we find the promise of creation's delivery from the "bondage of corruption." The curse from the Fall shall be lifted, and creation will share the gift of liberty given to the children of God. It is underscored that creation was not subjected to futility by its own will, but being subjected to this state, it was branded with hope of restoration, with the hope of salvation. Both humanity and the rest of creation await freedom from the corruption of sin through salvation in Christ. In this sense, creation is not divided along biotic and abiotic lines, nor by any other hierarchy for that matter.

Contrary to Romans 8, Rolston has a preference for life. When pushed by his critic Katie McShane on what makes something ethically valuable, his one word answer is simply "life" (Rolston 2007, 257). Though Rolston's value theory is more complex than this, he insists that ecosystems play a vital role in bringing

value into being. In fact, Rolston (1994, 24) claims that “[t]he ecosystem is the depth source of individual and species alike.” Without ecosystems, no individuals, and certainly no species, would ever be brought into existence. It is in the ecosystem that value is made. An ecosystem is defined as a unit containing both abiotic and biotic parts and as the place where these two parts intertwine (Jax 2009, 251). Biotic parts do not necessarily mean human parts. Humans are just a part of some ecosystems, even being a “late product of the system” (Rolston 1994, 25). Rolston’s insistence on the ecosystem as the locus of value raises the question of whether anything outside the ecosystem can also be considered valuable.

Rolston entertains the thought of what may come of something outside of an ecosystem, specifically, dirt. Dirt is not sentient, and as such, it cannot value itself, nor does it strive towards its own good. Though Rolston (1994, 26) acknowledges the role of dirt in ecosystems, being part of a process that fosters life; however, dirt conceived of outside of an ecosystem is devoid of value: “An isolated clod defends no intrinsic value.” While it may be hard to sympathize with a clod (a piece of dirt), how far may one stretch Rolston’s logic without betraying it? Instead of a piece of dirt, could the same be said of a small rock? If so, then a whole mountain might be introduced, as presumably the quantity of valueless non-ecosystemic entities makes no difference. Holding life at a distance, may we let a waterfall flow down the mountain while maintaining that no value is present? Stretching it even further, if all life—animal as well as plant—were gone from this world, and as such, all ecosystems, would intrinsic value be gone too? Put another way, if ecosystems are the sources of value, and ecosystems require life, does life hold the *sine qua non* of value for Rolston?

It seems to be so. Without ecosystems, without life, ecosystemic value theories struggle to value abiotic nature. This is not just a thought experiment; Rolston considers the case of Antarctica, the seventh continent, which is largely devoid of life. Rolston (2002, 115) admits that his own ecocentric theory is not fit for such a place, claiming that “[a]n appropriate ethics for the seventh continent differs radically from that for the other six.” An ethical system that places the generation of value and life fundamentally together is not fit to defend a lifeless world. Rolston (2002, 129) attempts to muster respect for such places as the top of Mount Everest—not an ecosystem but still demanding something from a human onlooker. This respect, whatever it may be, cannot easily be connected to the value generated from ecosystems. As I doubt Rolston would admit that the lifeless Antarctica or the top of Mount Everest is felt as valueless, why does he rob dirt of such value? As philosopher Keekok Lee (2007, 18) notes, Rolston has not paid much attention to the abiotic world on its own terms, as it usually plays a supplementary role in his value theory. Hverven and Lee continue the work of defending the value of the abiotic world through an argument of

telos as the criterion of intrinsic value, thus paving the way for a hierarchy of intrinsic value.

Both Lee (2007, 21) and Hverven (2023, 376) follow Rolston in holding telos as the criterion for a thing to have intrinsic value. In the Aristotelian sense, telos means to have an end goal or purpose (Hverven 2023, 376). Thus it follows that abiotic entities have no intrinsic value, as they have no adequate telos, according to Hverven's (2023, 378) reading of Rolston. This leads both Lee and Hverven to explore other values fit for the abiotic world(s), abandoning the hope of intrinsic value for this category. The strength of theocentrism is that it can take the unorthodox route of admitting to a telos for all of creation, not just for the traditional organisms.

Lee strives to disconnect telos from anthropocentrism. Towards this end, she employs three distinctions of teleology that warrant clarification. These brief definitions will be useful before continuing: "[T]eleomatic systems are classified as end-resulting, *teleonomic* systems are classified as end-directed, and *teleological* systems are end-seeking" (Christensen 1996, 305; emphasis added). Humans are assumed to be end-seeking, thus being full-fledged teleological creatures. Lee (2007, 22) admits that nonhumans (hogs, lions) have a telos, and even that organisms without consciousness such as oaks have telos, because "its life history and its associated activities could be understood as one of being goal-oriented or 'teleonomic.'" Lee (2007, 23) ties these goals to evolutionary concepts such as survival and reproduction. Because these creatures are end-directed—they are acting towards their end—they are qualified as teleonomic entities.

Finally, Lee (2007, 23) writes that "[u]nlike the biotic, the abiotic is 'teleomatic,' as it lacks not only consciousness (like the oak), but also because its behaviour is not goal-oriented (unlike the oak)." The abiotic entities are classified as end-resulting, because while they have an end, it is something that simply happens to them. In this strain of ecocentrism, intrinsic value—through having telos of the upper two kinds (teleological and teleonomic)—is reserved for living entities such as humans, hogs, and oaks. But is this biotic bias necessary in the theocentric worldview this article argues for?

To consider whether a biotic bias is necessary in a theocentric worldview, the foremost question is what makes something valuable in a theocentric theory. Theologian Ronald A. Simkins (2014, 400) is right in his straightforward claim on the matter: "God imputes the creation—humans, animals, the land—with value, and God the Creator is the measure of all that is good and right in the world. The biblical worldview is first and foremost theocentric." God imputes—attributes, assigns, ascribes—value on all of creation, which makes for both a theogenic and a theocentric value theory. It is God that creates value, and creation is valuable insofar as it relates back to its Creator. It is in this sense that the biblical worldview is theocentric.

How do these criteria of intrinsic value fit in the biblical theocentric worldview? Is the abiotic world according to the biblical view thus far explored either end-directed or end-seeking? Recall the biblical passage of Romans 8:19–22, where creation—abiotic world included—eagerly waits for revelation. Indeed, “[f]or we know that the whole creation groans and labors with birth pangs together until now” (Romans 8:22). With verbs like “groans” and “labors,” a simple end-resulting passivity is not an adequate description. While this language may contain elements of metaphor, as with Isaiah’s trees clapping their hands (Harris 2018), abiotic creation having “inclinations” is not unheard of (Wynn 2010, 158). Creation is here at the very least end-directed, by looking forward to and yearning after a specific end: salvation. Further, in Psalm 148, the abiotic parts of creation are specifically called to praise the Lord. If salvation is creation’s end goal, praising the Lord is its closest form of end-seeking possible. In attaining salvation, all but God are passive, humans as well as hail. The abiotic parts of creation cannot attain their own salvation any more than humanity can, thus their closest action to end-seeking is to praise and give thanks to the Lord for leading them to their goal. Although this worldview differs radically from Lee’s and Hverven’s, it aligns with their criteria for intrinsic value, affirming both biotic and abiotic intrinsic value in the biblical theocentric view.

Note that this discussion is not building an argument for the topic of dominion considered earlier. Where the dominion debate argues for a hierarchy of power/responsibility as in a stewardship model, the current debate with Lee and Hverven deals with the value status of all subjects, regardless of steward or that which is stewarded. Intrinsic value is prior to social models, akin to human rights being prior to the status of king or peasant, parent or child. Intrinsic value does not presuppose a certain type of power hierarchy, but it does presuppose a basic moral consideration for those possessing it.

Neither Romans 8 nor Psalm 148 show signs of a value hierarchy, whether in relation to salvation or a philosophical telos model. While Rolston’s, Hverven’s, and Lee’s ecocentrism differentiates levels of value, the nonhuman world’s longing and praise are taking place side by side as an interconnected creation. The egalitarian concept of value surfaces in all of creation’s presence and expression in the earlier excerpts, which rather than following trajectories of difference, underscore unity and creaturely (broadly understood) brotherhood. Even the mandate of dominion, when interpreted with Genesis 2:15 in mind, ensures a mutual respect for creation’s value.

However, ecocentric critique of egalitarian intrinsic value looms: Rolston (1988, 119) argues that “Schweitzer’s dilemma,” based on Albert Schweitzer’s reverence-for-life ethics that has reverence for all life, is fine in theory, yet in practice it leads to moral paralysis. Rolston’s solution is a hierarchy of intrinsic value. Visualized as a curve, Rolston (1988, 119) argues that “the intrinsic value of sentient animals would be lower than that of humans, that of insects

still less. The value of plants would be practically nil, a barely useable idea in ethics.” With this hierarchy, it becomes possible to make moral judgements, say, in favor of chopping down a tree that is at risk of falling on a house and endangering human lives, or mining minerals essential to green technology. In this hierarchy of value, more sentience and self-awareness means more value, hence why it culminates with humanity on the top (Rolston 1988, 223). Callicott (1999, 225; who coined Rolston’s “hierarchy”) connects the variations of value in organisms to their defense of their own kind as a good kind. Because sentient animals “*feel* the good that they defend,” they receive a value bonus, and because animals are self-aware of this defense, they receive an even greater value bonus, in Callicott’s (1999, 226) words. It is unclear to me exactly what Rolston’s criteria are for a value bonus. It is up to Rolston or other ecocentrists to specify the criteria for a value bonus and how it relates to biotic and abiotic entities. However, whether it is sentience, self-awareness, life, or something else, the point is that there is something regulating the degree of intrinsic value in Rolston’s theory that is not found in the biblical material analyzed in this article. The consequences of a biblical value theory as argued for here will be, with the critique of moral paralysis in mind, considered in the concluding section.

Intrinsic Value: Supervening or Final?

Returning to Genesis (1:31a), the final verse of the Bible’s first chapter culminates with God observing that which he has created and seeing goodness therein: “Then God saw everything that He had made, and indeed it was very good.” The type of intrinsic value inferred from this key verse will function as the final piece of the puzzle that is biblical intrinsic value. Further, an analysis of two kinds of intrinsic values will elucidate my divergence from Rolston and provide conceptual clarity to the *something* regulating Rolston’s value theory.

Philosopher Anna Deplazes-Zemp (2024, 169) identifies a distinction between several kinds of intrinsic values, two of which are relevant here: intrinsic final value (FIN) and intrinsic supervening value (SUP). Intrinsic FIN mirrors the basic definition presented earlier: “X is valuable and thus considerable for its own sake, as an end in itself” (Deplazes-Zemp 2024, 169). In addition to the Kantian definition, considerability is added, in accordance with the ethical demand of value realism. Intrinsic FIN, then, suffices at the very least for being a moral addressee. Moving over to the second kind of value, intrinsic SUP, “an entity X has intrinsic SUP value when X bears a value that supervenes on internal properties of X” (Deplazes-Zemp 2024, 169). Intrinsic SUP relies on—supervenes on—a certain property of an entity being present to which intrinsic value is attached. What this property is varies between philosophers,

one example being biocentrist Paul Taylor's property of "having a good of its own," which living beings have (Deplazes-Zemp 2024, 169).

Rolston is not mentioned by Deplazes-Zemp, but it seems to me that Rolston's insistence that the property of life must be present in order for intrinsic value to be admitted places his value theory in the intrinsic SUP category. This differs from my own specification that intrinsic value is present because God made it present in creation. "Being made by God" is not a property, it is an explanation of a fact, unlike life. Therefore, the kind of intrinsic value found in the Bible is intrinsic FIN rather than intrinsic SUP. Deplazes-Zemp recognizes intrinsic SUP as a subclass to intrinsic FIN, and I will now explore the consequences of locating intrinsic value in supervening on a property rather than as a final value.

The aforementioned *something* that regulates Rolston's intrinsic value of organisms is what qualifies his concept of intrinsic value as intrinsic SUP. Because intrinsic value supervenes on a property (life, sentience, self-awareness), that property varies in degrees, as then does its intrinsic value. Hverven (2023, 363) defends Rolston's value hierarchy by claiming that it cannot be decided once and for all which organisms have what kind of value and by what criteria such value supervenes on. Perhaps that is why it is hard to locate Rolston's exact criteria for evaluation, because it changes based on our knowledge of the world. If Rolston's theory was thought of before self-awareness was discovered, or before animals were thought to be sentient, it would be an incomplete theory. But who is to say that we have now discovered all criteria for intrinsic value? What if we discover a new concept that fits perfectly in next to life, sentience, and self-awareness? Perhaps more importantly, who decides what the properties that intrinsic value supervenes on are? Hverven (2023, 364) recognizes this problem and wants to maintain the possibility of letting nature have values that humans may not ever be able to recognize.

Intrinsic value as a final value accords with the value statement in Genesis 1:31. God does not specify a common property in creation that the intrinsic value supervenes on. God does not add a "because" after stating that creation is good. God created, and then he saw that what he created, all he created, was good. It was not good *for* anything, but it simply and intrinsically was good. That is why all of creation is awaiting the same salvation, that is why covenants are entered with all of creation, that is why God cares for each part of creation, and creation thanks him back with praise. All these excerpts from the Bible point to the same phenomenon of there being intrinsic value in all of creation. A theocentric, value realism, nonhierarchical, intrinsic FIN type of value, at that. This kind of value is biblically grounded and philosophically coherent, providing a solid fundament for the value of creation.

Conclusion

This article has argued that a biblical view of value affirms that all of creation is imbued with intrinsic value of a theocentric, objective, egalitarian, and final kind. Intrinsic value is frequently recognized as being in accordance with the Bible, however, a deeper analysis of the biblical value concept was missing. Further, through analyses of various biblical texts, it has been demonstrated that reading the Bible with an ecotheological lens challenges the status quo of anthropocentrism. Ecocentrism and its philosophical defense functioned as a fruitful interlocutor through elucidating theocentrism, its alternative, and providing fundamental concepts for an independent, biblical value theory.

In this article, I have primarily focused on the ontological aspects of intrinsic value, but owing to its value realism, certain metaethical aspects proved relevant. I have not dealt with specific moral issues by looking at right and wrong actions. The specific ethical consequences of the value theory proposed here warrant further exploration in future research. However, this article will end with some thoughts on the way forward.

It should be noted that I am not arguing for some type of enlightened stewardship. Admitting to seeing intrinsic final value in creation/nature does not grant human instrumental values (be they monetary, aesthetic, recreational, or otherwise) priority over the flourishing of intrinsically valuable beings and entities. The practical consequences of incorporating the biblical worldview argued for here would imply a monumental lifestyle change in diet, consumption, and everyday life, but it would be ethical, possible, and beneficial in light of the contemporary crises of climate change and natural degradation. This does not mean that plants cannot be eaten for sustenance, but it is hard to see how industries of unnecessary animal violence and slaughter can survive the criticism of egalitarian intrinsic value. That is not to say that this biblical view of value in creation is categorically against infringing upon entities with intrinsic value; sometimes it is unavoidable and right to act against other valuable entities (see Plumwood 2002, 145). That a human tills and harvests from the Earth, thus sustaining life, is part of respecting human life as created by God. As such, we may build our abodes, but not without careful consideration of the consequences of our actions. Recognizing that the Earth is intrinsically valuable gives rise to an ethical demand to treat it responsibly. This ethical point is as valid for philosophy as it is for theology. In this trajectory, theologian James M. Gustafson's (1981, 1984) double volume on *Ethics from a Theocentric Perspective* and theologian Michael S. Hogue's (2008) later expansion may prove competent guides.

It has been beyond this article's scope to explore ethics for the whole universe, life-less planets included. However, the further human technological advances go, the closer these planets are to us, and the more they demand our attention. Future research should explore the trajectories of galactic ethics, and it seems

to me that theocentrism is better equipped to defend the value of other planets than that of life-oriented axiological theories. It has been argued that intrinsic value is integral to protecting nature (Samuelsson 2022). This article's biblically grounded theocentric and objective intrinsic value theory challenges secular environmental philosophy to expand its moral horizons regarding intrinsic value in nature, extending the frontier beyond the human and beyond life itself.

Competing Interests

The author declares that they have no competing interests.

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The Recursive Witness: Lurianic Kabbalah and the Rigvedic Cosmogony as Complementary Models of Observer-Instantiated Reality

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This article proposes a comparative theological reading of the Lurianic doctrine of *tzimtzum* (divine contraction) and *shevirat ha-kelim* (breaking of the vessels) alongside the Rigvedic Nāsadīya Sūkta (RV 10.129), arguing that both traditions articulate structurally homologous accounts of cosmogenesis through observation. Drawing on Hayyim Vital's *Etz Hayyim*, Sha'ar HaKlaim, Stephanie W. Jamison and Joel P. Brereton's critical edition of the Rigveda, Elliot R. Wolfson's apophatic reading of *tsimtsum*, and Sandra Valabregue-Perry's analysis of Ein Sof as "integrative multiplicity," the article advances a framework termed "observer-instantiated cosmology," in which reality emerges through the recursive relation between witness and witnessed rather than through unilateral divine action. Both traditions resist metaphysical closure, position human consciousness as cosmogonically essential, and articulate a participatory ontology in which observer and observed mutually constitute each other in an ongoing process with no absolute origin or terminal endpoint. The article demonstrates how both traditions understand *tikkun* (repair) and *yajña* (sacrifice) not as commemorative but as constitutive, bringing into being a new configuration of reality through disciplined attention, intentional practice, and recognition of objective patterns. Wolfson's apophatic alternative is engaged directly as a productive complication that deepens rather than refutes the observational framework, and the ecological and ethical implications of the analysis for contemporary contexts of fragmentation and epistemic crisis are drawn out at each stage.



Introduction: The Problem of Cosmogonic Agency and the Observer's Role

The question of origins—*Woher? Warum?* (Whence? Why?)—has preoccupied religious thought across traditions, from Augustine's meditations on creation ex nihilo to the Daoist contemplation of the Dao that cannot be named. Yet the presumption underlying most cosmogonic narratives—that creation requires an anterior creative agent possessing full intentionality and causal efficacy—may itself constitute a category error rooted in substantialist metaphysics. Both the Lurianic Kabbalistic tradition emerging from sixteenth-century Safed and the Rigvedic hymns of the second millennium BCE propose something more radical: that creation is not produced by a fully determinate preexisting deity but rather generates its conditions through a process in which observation plays an ontologically constitutive role.

This article examines two textual moments of cosmogonic uncertainty: Isaac Luria's doctrine of *tzimtzum* (divine contraction) and *shevirat ha-kelim* (breaking of the vessels) as transmitted through Hayyim Vital's *Etz Hayyim*, Sha'ar HaKlaim, and the Nāsadīya Sūkta of the Rigveda (RV 10.129), which famously concludes with epistemic doubt regarding the origins of creation. Both texts resist the metaphysics of substance in favor of what I term "observer-instantiated cosmology"—a framework in which reality emerges through the recursive relationship between witness and witnessed rather than through unilateral divine action.

The comparative project undertaken here follows the methodological insights of comparative theology as articulated by Francis Clooney (2010, 12–15) and Robert Neville (2001, 89–92), seeking "structural resonances" that illuminate how different traditions address similar existential and metaphysical problems through distinct but functionally analogous conceptual frameworks. No claim of historical contact or doctrinal identity between Lurianic Judaism and Rigvedic Brahmanism is advanced or required. What the comparison does claim is that both traditions independently articulate what might be called a participatory ontology—the recognition that observer and observed mutually constitute each other in an ongoing process with no absolute origin or terminal endpoint. This recognition is not merely theoretical; both traditions build from it an ethic of attention and an account of human responsibility that have urgent resonance in contemporary contexts of ecological crisis, social fragmentation, and epistemic polarization.

A significant complication must be addressed at the outset. Elliot R. Wolfson's apophatic reading of *tsimtsum* (his spelling of *tzimtzum*)—developed at length in *Heidegger and Kabbalah* (2019) and *Apophysis and Envisioning the Invisible* (2026)—offers an interpretation that both enriches and challenges the present analysis. On Wolfson's account, *tsimtsum* is not primarily an act of withdrawal that creates observational distance but an apophatic gesture in which divine presence becomes manifest precisely through its concealment—a "bestowing

refusal” (*schenkende Verweigerung*) in which the infinite grants the condition for finite appearance by withholding itself. I engage this challenge directly throughout, arguing that the apophatic and observational readings address different registers of the same event: the apophatic characterizes the divine side of the cosmogonic relation; the observational characterizes its epistemic and cosmogonic function from the creaturely side. Both converge on the central claim that *tsimtsum* makes knowledge and observation structurally necessary rather than incidental to creation.

Tzimtsum as Primordial Observation: The Withdrawal That Creates Space

The Lurianic Innovation in Jewish Mystical Thought

The Lurianic Kabbalistic system, developed by Isaac Luria (1534–72) in Safed and transmitted primarily through the writings of his disciple Hayyim Vital, represents a radical departure from earlier Jewish mystical cosmologies. Where classical Kabbalah, exemplified by the Zohar and the systematic exposition of Moses Cordovero, understands creation as a progressive emanation (*atzilut*) of divine attributes (*sefirot*) from the infinite Ein Sof, Lurianic thought introduces a founding paradox: before any positive emanation could occur, the infinite divine presence had to withdraw to create space for the finite (Scholem 1941, 260–65; Tishby 1989, 537–42; Magid 2008, 18–45).

This doctrine of *tzimtsum* (literally “contraction” or “concentration”) emerges from a theological dilemma: If God is truly infinite and fills all conceptual and actual space, how can anything other than God exist? Luria’s solution inverts the logic of emanation. As Vital records at the opening of *Etz Hayyim, Sha’ar HaKlalim* 1:1:

Before the emanations were emanated and the creatures were created, the simple supernal light filled all reality. There was no empty space (*chalal panui*) whatsoever, for all was filled with that boundless, simple light... When it arose in His simple will to create worlds . . . He contracted that light, withdrawing to the sides around the central point, leaving a vacated space (*makom panui*). (Menzi and Padeh 1999, 3)

This passage articulates several revolutionary claims. First, God’s initial creative act is negative rather than positive—a withdrawal, an absencing, a making-room rather than a filling-up. As Gershom Scholem (1941, 261) notes, this represents “an act of divine self-limitation, of contraction into Himself” that creates the logical and ontological precondition for anything other than God to exist. The first moment of creation is thus characterized by divine *kenosis*—a self-emptying that paradoxically enables the subsequent revelation of divine creativity.

Second, the state from which *tzimtzum* withdraws is not a featureless, undifferentiated unity on the Plotinian model. As Sandra Valabregue-Perry (2010, 2012) demonstrates in her sustained study of the concept of Ein Sof in theosophical Kabbalah, the Kabbalistic Ein Sof is better understood as an “integrative multiplicity”—a nondifferentiated plenitude in which the distinctions of the *sefirot* are already immanent, though infolded and inexplicit. This distinguishes Ein Sof sharply from the Neoplatonic One, which achieves its unity precisely through the exclusion of plurality. The “contraction” of *tzimtzum* does not therefore move from simple homogeneity to differentiation but rather from inexplicit to explicit plurality—from the all-encompassing “integrative multiplicity” of the infinite to the externalized, structured differentiations of creation. The word *tzimtzum* itself carries this semantic density: in rabbinic usage, it can mean both concentration (gathering inward) and restriction (creating limit), enacting the paradox that Ein Sof’s self-gathering is simultaneously the act that permits otherness to appear.

Third, and most crucial for the present analysis, *tzimtzum* establishes observational capacity as ontologically prior to substance. Before any thing can exist, there must be a position from which that thing can be witnessed—a standpoint external to it from which its boundaries can be discerned and its identity established. The withdrawal of Ein Sof creates precisely this observational capacity: a gap, a distance, a relationship of regard between what withdraws and the space left by its withdrawal. The *reshimu*—the residual trace of divine light remaining within the *makom panui* (vacated space) after the withdrawal—ensures that this space is not dead emptiness but a site charged with potential, structured by the memory of what departed it.

Wolfson’s Apophatic Challenge and Its Productive Complication

Wolfson’s reading of *tsimtsum* in *Heidegger and Kabbalah* offers a philosophically sophisticated alternative that must be engaged directly. In chapter 4, “*Šimsum*, *Lichtung*, and Bestowing Refusal,” Wolfson argues that the Lurianic doctrine is structurally analogous to Heidegger’s concept of *Lichtung* (clearing)—the opening in which Being grants beings their disclosure by withholding itself from presence. On Wolfson’s (2019, 137–96) account, *tsimtsum* names a “bestowing refusal” (*schenkende Verweigerung*): the withdrawal is not a simple absence but the very mode by which the infinite grants the finite its space for appearing.

Wolfson extends this argument in Chapter 4 of *Apophysis and Envisioning the Invisible*, “Metalogic of the Trace in Lurianic Kabbalah: Transcendent Immanence and Immanent Transcendence,” where he reads *tsimtsum* through an apophatic lens: the contracted divine does not become simply absent from the *makom panui* but is present precisely as the trace (*reshimu*) whose concealment is itself a form of disclosure. The infinite becomes manifest only by rendering itself non-manifest; the withdrawal is not prior to revelation but constitutive of

it (Wolfson 2026). This yields what Wolfson calls the “dialetheic structure” of the Lurianic cosmos: a reality constituted by the identity of concealment and disclosure, presence and absence, at every level.

This apophatic reading creates genuine tension with an observer-instantiation account. If *tsimtsum* names a mode of divine self-manifestation through withdrawal, then the “observational vacuum” is not primarily a space cleared for creaturely observation but the very site at which the infinite undergoes its own apophatic self-disclosure.

The tension is productive rather than fatal to our argument. The apophatic and observational readings operate at different registers. The apophatic characterizes the divine side of the cosmogonic relation—what *tsimtsum* means from the perspective of Ein Sof’s own self-manifestation. The observational characterizes its epistemic and cosmogonic function from the creaturely and comparative-theological perspective—what *tsimtsum* makes necessary and possible in terms of the structure of knowledge and witnessing. Both converge on a shared insight: that *tsimtsum* creates the structural conditions under which something like observation—whether divine self-disclosure or creaturely recognition—becomes possible. On both accounts, the *makom panui* is not inert emptiness but a structured opening, a site constituted by relation rather than substance. Crucially, both readings also imply that the cosmogonic structure demands an ongoing practice of attentive engagement: for Wolfson, the trace must be read; for the observational account, the sparks must be recognized. Either way, the cosmos requires witness.

Rigvedic Negation and the Priority of Observational Capacity

The Nāsadiya Sūkta, the 129th hymn of the tenth book of the Rigveda, opens with a parallel gesture of primordial negation. The first verse, in Stephanie W. Jamison and Joel P. Brereton’s (2014, 3:1607) critical translation, reads:

Then neither being (*sat*) nor non-being (*asat*) existed; neither the realm of space nor the sky beyond. What enveloped it? Where? Under whose protection? Was there water, bottomlessly deep? (RV 10.129.1)

This opening negation refuses simple presence as the ground of creation. Neither being (*sat*) nor nonbeing (*asat*) existed in this primordial state—a condition logically prior to ontological distinction itself. As Brereton (1999, 252–54) observes, the hymn “systematically excludes all the usual candidates for primordial reality”—not only existence and nonexistence but atmospheric space (*rajas*), the heavens (*vyoman*), death (*mṛtyu*), and immortality (*amṛta*)—leaving not void but a state of radical indeterminacy that precedes the possibility of predication. In the Vedic grammatical tradition, the prefix *nā* carries the force

of total rather than relative negation, sharpening this point: the primordial state excludes not just this or that being but the ontological category as such.

The third and fourth verses introduce the crucial element of observation:

Darkness was there: at first concealed in darkness, this All was indistinguishable water. That which, becoming, was covered with the void—that One arose through the power of heat (*tapas*). (RV 10.129.3; Jamison and Brereton 2014, 3:1607)

Desire (*kāma*) came upon it in the beginning: that was the first seed of mind. The connection of being in non-being—the poets found it by searching in the heart with wisdom. (RV 10.129.4; Jamison and Brereton 2014, 3:1607)

Tapas—often translated as “heat,” “warmth,” or “ascetic fervor”—here functions as concentrated attention, the focused intensity of consciousness that brings determination to the undetermined (Kaelber 1989, 3–5). The Vedic tradition develops this insight in ritual contexts through the concept of *dikṣā* (consecration or initiation), in which the *yajamāna* (sacrificer) undergoes a period of concentrated withdrawal that mirrors and enables the cosmogonic act—a structural parallel to *tẓimtẓum* that the Vedic commentarial tradition makes explicit in the *Śatapatha Brāhmaṇa*’s account of Prajāpati’s self-gathering before creation (*Śatapatha Brāhmaṇa* 6.1.1.1–5; Eggeling 1882).

Kāma (desire) is identified as “the first seed of mind” (*manaso retah prathamam*). Bimal Krishna Matilal (1986, 56) argues that *kāma* should be understood not as libidinal impulse but as “the fundamental intentionality of consciousness—the structure of directedness-toward that establishes subject and object as distinct yet related.” Jan Gonda’s (1952, 12–18) philological study of *manas* in Vedic usage confirms that the term carries not merely cognitive but cosmogonic weight—mind as the faculty through which the undifferentiated becomes articulate. The verse credits “sages who searched with their hearts’ wisdom” (*kavayo manīṣā*) with discovering “the connection of being in non-being”—suggesting that reality’s structure is not transparent but requires the interpretive activity of consciousness, the probing attention of the *kavi* (poet-seer), for its disclosure.

Comparative Analysis: Withdrawal as Observational Precondition

Both *tẓimtẓum* and the Rigvedic primordial negation establish what might be termed an “observational vacuum”—a space cleared of fully determinate content within which the act of witnessing can occur. If Ein Sof is not simple undivided unity but “integrative multiplicity” (Valabregue-Perry 2012, 429), then the parallel with the Rigvedic primordial state is even closer than it first appears: both describe not featureless homogeneity but an inexhaustible plenitude in which distinctions are present but infolded. The creative act in both cases moves

from inexplicit to explicit differentiation—from possibility to actuality through a process in which observation (*tapas*, withdrawal-as-apophatic-disclosure) plays the enabling role. Both traditions further agree that this movement is not a fall from perfection but a necessary unfolding: the *makom panui* is not a wound in the divine body but its productive opening; the darkness “concealed in darkness” (*tama āsīt tamasā gūḥam agre*) of the Nāsadiya Sūkta is not chaos to be overcome but the condition of *tapas*’s concentrated power.

Shevirat Ha-Kelim and Kāma: Generative Rupture as Structural Necessity

The Breaking of the Vessels and the Generation of Plurality

Following *tzimtzum*, Lurianic cosmology describes the re-entry of divine light into the vacated space through linear emanation (*keav*), structured through vessels (*kelim*) corresponding to the ten *sefirot*. A precision absent from earlier versions of this argument must be registered: *shevirat ha-kelim* (the breaking of the vessels) occurs within the intra-divine emanative process, not as the production of the differentiated material cosmos as such. The shattering takes place as the vessels through which the primordial light flows from *Adam Kadmon* (Primordial Man) into the world of *Atzilut* (Emanation) prove unable to withstand the intensity of the light they receive. The resulting dispersion of sparks (*nitzotzot*) into *kelippot* (husks or shells) then becomes the substratum out of which material creation is formed—the shattering is the precondition of material existence, not its product (Vital, *Etz Hayyim*, Sha’ar HaKlalim 1:2; Menzi and Padeh 1999, 5–7; Fine 2003, 128–57; Tishby 1989, 540–45). The ontological stakes are significant: *shevirat ha-kelim* does not create the differentiated cosmos but discloses the structural condition—dispersion, distance, the multiplicity of standpoints—without which differentiated existence would have no ground.

Wolfson’s (2002, 117–25) emphasis on the *shevirah* as indexing a form of divine pathos is pertinent here: the dispersion of sparks “signifies not only the fragmentation of created being but a disruption internal to divinity itself,” such that transcendence becomes “irreversibly entangled with rupture.” The catastrophe is thus at once cosmogonic and theological—the condition for material plurality and the condition for divine self-knowledge through its own externalized fragments. This entanglement is what makes *tikkun* (repair) possible and necessary: because the rupture is internal to divinity, the repair must also be—and human action is the medium through which that interiority is re-gathered.

Daniel Matt (1995, 119) articulates the theodical significance: “The breaking of the vessels is not a cosmic accident but the necessary condition for the existence of discrete, individuated beings. Without shattering, there would be no separate existence, no human freedom, no possibility of *tikkun*.” Lawrence Fine (2003, 135–37) emphasizes that *tikkun* places humanity “at the very center of the cosmic

drama” in a way unprecedented in earlier Jewish thought: humans are not merely recipients of divine grace but “active agents whose every deed has cosmological significance” through the recognition and elevation of scattered sparks.

Kāma and the Relational Structure of Existence

The Nāsadiya Sūkta articulates a parallel structure of generative rupture through the concept of *kāma* (desire). Verse four states that *kāma* “came upon it in the beginning: that was the first seed of mind” (RV 10.129.4; Jamison and Brereton 2014, 3:1607). This is an internal differentiation—a self-rupturing of the primordial One—rather than the action of an external agent upon inert matter.

Matilal’s (1986, 56) analysis is apt: *kāma* is not primarily libidinal impulse but “the fundamental intentionality of consciousness—the structure of directedness-toward that establishes subject and object as distinct yet related.” *Kāma* introduces the relational structure (subject directed toward object) that enables conscious experience and cosmogonic knowing. As Ananda K. Coomaraswamy (Coomaraswamy 1941, 34–36; cf. *Bṛhadāraṇyaka Upaniṣad* 1.4.17) notes, the parallel to Upaniṣadic texts where the primordial Self (*ātman*) desires (*akāmayata*)—“May I be many, may I be born forth” (*bahu syām prajāyeya*)—is illuminating. The Upaniṣadic commentarial tradition, particularly Śaṅkara’s reading of this passage in his commentary on the *Bṛhadāraṇyaka*, treats *akāmayata* as the primordial act of *adhyasa* (superimposition) by which the non-dual ground appears to itself as dual: an ontological movement structurally homologous to *tzimtzum*’s creation of an apparent interiority.

Rupture as the Condition for Observation

Both traditions understand cosmogonic rupture as establishing the precondition for observation. In Lurianic terms, the emanative process creates the structural positions—including those defined by trapped sparks distributed through the material world—from which recognition becomes possible. Without dispersion, there would be no standpoints from which recognition could occur. In Rigvedic terms, *kāma* establishes the subject–object relation that makes observation possible. Before *kāma*, there is only the One; after *kāma*, there is the One as structured by desire—differentiated into observer and observed. Both ruptures operate as conditions of possibility for observation rather than as direct creators of the observable world, and both are understood by their respective traditions not as failures or falls but as creative necessities whose productive potential is realized through human practice.

Divine Posteriority and Epistemic Instability

“The Gods Came Afterwards”: Rigvedic Inversion of Divine Priority

The Nāsadiya Sūkta culminates in one of the most philosophically provocative statements in the entire Vedic corpus:

Who really knows? Who shall here proclaim it?—whence was it produced, whence is this creation? The gods are on this side, along with the creation of this (world). So then who does know whence it came to be? (RV 10.129.6; Jamison and Brereton 2014, 3:1608)

He, the first origin of this creation, whether he formed it all or did not form it, whose eye controls this (world) in highest heaven—he surely knows it, or perhaps he does not know. (RV 10.129.7; Jamison and Brereton 2014, 3:1608)

The clause “the gods are on this side, along with the creation of this world” (*arvāḡ devā asya visarjanena*) inverts the standard logic of religious cosmogony. If the gods arise within creation rather than standing outside it as originators, they cannot be its ultimate source. As Brereton (1999, 258) argues, this verse “undermines the entire premise of divine cosmogonic agency as understood in conventional religious thought.” The *adhyakṣa* (supervisor, overseer) in verse seven—“whose eye controls this world in highest heaven”—is grammatically the one who might know (*so aṅga veda*) or might not (*yadi vā na veda*). The disjunction is not rhetorical hesitation but structural: a knowledge position that is itself embedded within what it surveys cannot achieve the closure its survey requires. Observation is recursive and self-implicating.

Ein Sof and the Limits of Divine Knowledge

Lurianic Kabbalah articulates a parallel problematic regarding divine knowledge and observability. The Ein Sof cannot be known or described through any positive attributes. As Scholem (1941, 261) explains, it “remains eternally hidden, withdrawn into itself” and “cannot become an object of knowledge or experience.” Yet as Valabregue-Perry’s (2010, 2012) analysis makes clear, its unknowability is not the unknowability of the empty but of the overfull: an “integrative multiplicity” that encompasses rather than excludes all determination, and whose infinity can be approached only through a logic of negation that exceeds simple apophysis. Wolfson (2026, chap. 4), working in the apophatic idiom, describes this as the infinity “that can be described only as indescribable” because it encompasses rather than excludes all determination.

The *tzimtzum* itself introduces a permanent structural gap in divine self-knowledge. By withdrawing to create the *makom panui*, Ein Sof establishes a space that is, by definition, the site of its own withdrawal. Wolfson (2019, 174–88) argues that this creates a “kenotic epistemology” in which the divine knows creation only through mediation—through the light that enters the vacated space, interacts with the vessels, and disperses through the world. Human consciousness enters this framework as the agent through which the divine comes to know itself in its scattered form. Fine (2003, 138) emphasizes that this positions humanity as “partners in the divine self-knowledge.” The divine

cannot fully know itself in its scattered form without human observational and interpretive activity.

The epistemic parallel with the Rigvedic problematic is sharp. Just as the Vedic gods arise “on this side” of creation and cannot possess knowledge of what preceded their arising, the Lurianic Ein Sof withdraws in *tzimtzum* and cannot directly know the vacated space and its contents. In both cases, perfect divine knowledge is structurally impossible—not as a deficiency but as the necessary correlate of creaturely existence. The divine requires the mediation of finite, embodied consciousness: *tikkun* in the Lurianic case, sacrificial maintenance in the Vedic case.

Recursive Observation and the Impossibility of Final Knowledge

Both traditions inscribe epistemic instability at the heart of their cosmogonies. The Rigvedic hymn ends with irreducible doubt; the Lurianic system insists on the unknowability of Ein Sof and the opacity of *qlippot*. In both systems, observation is self-referential in a way that precludes epistemic closure: every observer is also observed, every witness is also witnessed. This is not a failure of knowledge but its proper condition—what Karen Barad (2007, 88–97), working in a contemporary register, calls “agential realism”: the recognition that knowledge is always perspectival, always produced from within the reality it seeks to understand. Both the Rigvedic sages who “search with their hearts’ wisdom” (*kavayo manīṣā*) and the Lurianic Kabbalist who performs *tikkun* with partial understanding refined through practice model this form of engaged, humble, recursive knowing—knowing that acts without claiming to have fully grasped what it acts upon.

Contemporary philosophy of science has grappled with analogous problems in the rubric of observer effects in quantum mechanics and John Wheeler’s (1983, 182–96) “participatory universe” hypothesis (Stapp 2007, 45–67). Wheeler (1983, 194) argues that “the universe does not exist ‘out there,’ independent of all acts of observation. It is in some strange sense a participatory universe.” Both Lurianic Kabbalah and the Nāsadiya Sūkta anticipate this insight by positioning observation as ontologically constitutive rather than merely epistemologically revealing—and both draw from this structural insight an ethic of attention that treats how we witness as a matter of cosmic consequence.

Tikkun and Yajña: The Ontological Weight of Human Consciousness

Human Participation in Lurianic Cosmology: The Multilevel Structure of Tikkun

The doctrine of *tikkun olam* (repair of the world) represents the culmination and purpose of the Lurianic cosmological narrative—and it is here that the participatory ontology the article has been tracing achieves its most precise

articulation. Through proper intention (*kavanah*) in prayer and the performance of commandments (*mitzvoṭ*), humans directly participate in releasing divine sparks from their material prisons and returning them to their source (Fine 2003, 135–37; Tishby 1989, 556–61). The Lurianic literature specifies the internal structure of this practice with remarkable precision. *Kavanah* (intention or directed attention) is not vague devoutness but a disciplined focusing of consciousness toward the specific *sefirah*, or divine configuration, implicated in a given act; it is further supported by *hitbonenut* (contemplative self-inquiry, the capacity to look inward in order to discern the divine element embedded in one's own psyche) and *devekut* (cleaving or adhesion to the divine), the sustained orientation of consciousness toward its source that transforms even mundane action into a vehicle of repair.

These three terms together specify what the article means by an “ethic of observation.” *Tikkun* operates simultaneously at multiple levels that must be distinguished to appreciate its full scope. Cosmologically, it involves the literal elevation of divine sparks from materiality—a claim the Lurianic tradition makes without apology or metaphorical hedging. Psychologically, it involves the recognition and integration of fragmented aspects of the self: the “fallen sparks” that in depth-psychological idiom correspond to unconscious potentials, shadow elements, and dissociated experience that the practice of *hitbonenut* brings into the light of awareness. Theologically, it involves the repair of the relationship between the divine and creation, between Ein Sof and the fragmented cosmos, such that the final state (*tikkun ha-olam*) is not a simple restoration of the original but, as Fine (2003, 142) notes, “a new configuration of reality” that incorporates the generative potential of the catastrophe itself. The catastrophe is not undone but transfigured.

From the perspective of observer instantiation, *tikkun* represents the most direct articulation of the central argument: the ontological status of observed matter—whether a divine spark remains trapped or is elevated—depends on human observation, intention, and action. The spark is not metaphorically but literally released from the *qlippah* (husk) that imprisons it and ascends toward reunification with the divine when it is met with *kavanah*. Without human participation, the sparks remain in exile; the divine cannot repair itself through its own resources alone. Every conscious act performed with awareness of its cosmic significance contributes to *tikkun*—not in the sense of restoring some original perfection but in bringing into being a configuration of reality that the original catastrophe made possible and that only embodied, attentive human action can actualize.

Yajña and the Maintenance of Cosmic Order

Vedic cosmology articulates a parallel understanding of human participation in cosmic maintenance through the concept of *yajña* (sacrifice, ritual offering)—

but with a depth and precision that goes well beyond mechanical ritual performance. The paradigmatic text is the *Puruṣa Sūkta* (RV 10.90), which describes creation as resulting from the sacrifice of the cosmic person (*Puruṣa*). But it is in the *Brāhmaṇa* literature that the performative ontology of *yajña* is most fully elaborated. The *Aitareya Brāhmaṇa* (1.1–3) explicitly states that the one who performs the sacrifice “constitutes both himself and the world” (*ātmanam lokam ca samam karoti*)—a formulation that encodes the participatory ontology of the ritual in a single compact expression. The *Taittirīya Saṃhitā* (1.6.10.1–2) extends this: “By sacrifice indeed the gods conquered the heavens; by sacrifice let the sacrificer conquer the heavens.” The cosmogonic sacrifice is not merely repeated in ritual but is ongoing: *yajña* is the mechanism by which the cosmic order (*rta*) is not merely commemorated but actively sustained.

As J. C. Heesterman (1993, 24–27) argues, Vedic ritual is “not merely commemorative but performative—it does not simply recall the primordial sacrifice but actively participates in it, sustaining and renewing the cosmic order (*rta*) that emerged from that original act.” The *Śatapatha Brāhmaṇa* makes this explicit: “Prajāpati, having created the creatures, became exhausted and the creatures departed from him. He saw this sacrifice (*yajña*), this restoration (*samskāra*). He offered it and thereby regained the creatures. Therefore one should offer sacrifice, for sacrifice is restoration” (*Śatapatha Brāhmaṇa* 1.1.1.1–3; Eggeling 1882). The sacrifice must be performed with correct intention (*saṅkalpa*), precise ritual awareness, and recognition of the act’s cosmogonic significance—a complex of intentional structures that mirrors *kavanah* in the Lurianic system almost term by term. Brian K. Smith (1989, 78–81) emphasizes that “humans are not peripheral to cosmic processes but central—the sacrifice that sustains the world is a human act performed by human agents with human intention.” Without regular sacrificial practice, the cosmos would fragment; the *rta* would dissolve back into the undifferentiated chaos of *anrta*. The maintenance of order is a human responsibility and a cognitive achievement.

Observation as Cosmic Responsibility

Taken together, the Lurianic and Vedic accounts articulate an “ethic of observation”—the recognition that consciousness carries cosmological weight, that how we attend to reality affects what reality is. In Lurianic terms, every act of attention potentially elevates or degrades the divine sparks encountered. To observe materiality with awareness of its divine origin is to contribute to *tikkun*; to observe it with purely instrumental or exploitative intention is to reinforce the *qlippot* that imprison the sparks. In Vedic terms, human consciousness sustains the cosmic order through properly directed attention and action. The sacrifice must be performed with correct intention (*saṅkalpa*), precise ritual awareness, and recognition of the act’s cosmogonic significance. Mechanical performance

without understanding does not achieve the desired effect; the efficacy of *yajña* depends on the sacrificer's conscious participation in the cosmogonic process.

Both frameworks reject the modern Western assumption of observation as passive, neutral registration of independent facts. Instead, they propose that observation constitutes reality in a strong sense—that the ontological status of what is observed depends on how consciousness engages with it. Subject and object are not independently existing entities that subsequently enter into relation; they are co-constituted through the relation itself. The observer does not stand outside what is observed; both arise together in the act of observation. This is not solipsism: both traditions insist on disciplined practice, correct intention, and recognition of objective patterns as the conditions of genuine engagement. But it is an insistence that reality is unfinished, that consciousness participates in its ongoing constitution, and that we bear responsibility for how we observe and act within it. Catherine Keller's (2003, 103–7) theological work on “becoming” articulates this in a contemporary idiom: “Creation is not a one-time event in the past but an ongoing process in which divine becoming and creaturely becoming mutually condition each other.” Lurianic Kabbalah and Vedic cosmology anticipate this insight with a philosophical precision that centuries of practice have honed into its sharpest form.

Implications for Comparative Theology and Philosophy of Religion

Challenging Substantialist Metaphysics

The comparative framework developed here challenges substantialist metaphysics—the view that reality is composed of discrete entities characterized by essential properties that exist independently of observers. Both Lurianic Kabbalah and Vedic cosmology articulate what might be called “relational ontology” or “process metaphysics.” In Lurianic thought, divine sparks exist in differentiated form (trapped) or unified form (elevated) depending on human observational and intentional engagement; the spark's ontological status is not fixed but shifts based on its relation to consciousness. In Vedic thought, the cosmos requires ongoing sacrificial maintenance to preserve its order; without human ritual participation, reality tends toward dissolution. The being of the cosmos is not substantial self-maintenance but processual achievement through conscious engagement.

Alfred North Whitehead's (1978, 50) process philosophy articulates a structurally parallel insight: “The misconception which has haunted philosophic literature throughout the centuries is the notion of ‘independent existence.’ There is no such mode of existence; every entity is to be understood in terms of the way it is interwoven with the rest of the universe.” This shift from substance to relation has profound implications. If reality is fundamentally relational, the traditional subject–object distinction becomes problematic not

as an epistemological limitation but as an ontological description. Subject and object are not independently existing entities that subsequently enter into relation but are co-constituted through relation itself. Both Lurianic Kabbalah and Vedic cosmology enact this insight not merely as philosophical thesis but as practical orientation: the work of *tikkun* and *yajña* is precisely the ongoing practice of co-constitutive engagement.

Observer Participancy and Contemporary Physics

The observer-instantiated cosmology articulated in both traditions resonates with Wheeler's "participatory universe" hypothesis and discussions of observer-dependent collapse of the wave function. Wheeler (1983, 184) argues that observation is not passive registration but active participation in determining what becomes actual: "No phenomenon is a real phenomenon until it is an observed phenomenon." While no claim of theoretical identity between ancient religious cosmology and quantum mechanics is advanced, the structural parallel—that observation collapses potentiality into actuality, that reality is participatory rather than merely given—illuminates the deep grammar shared across these traditions. Stapp's (2007, 52–58) extension of Wheeler's insight suggests that "consciousness is ontologically implicated in the structure of reality," a claim that both Lurianic and Vedic cosmologies can be read as premodern articulations of that claim, worked out through centuries of contemplative practice rather than laboratory experiment.

Epistemic Humility and Contemporary Implications

Both traditions inscribe epistemic humility at the heart of cosmological reflection. The Nāsadiya Sūkta ends with irreducible doubt; Lurianic Kabbalah insists on the unknowability of Ein Sof and the opacity of *qlippot*. Neither tradition offers epistemic closure or complete cosmological certainty. Both the Rigvedic sages who "search with their hearts' wisdom" and the Lurianic Kabbalist who performs *tikkun* with partial understanding refined through practice model a form of engaged, humble, recursive knowing. This has immediate implications for contemporary contexts of ecological crisis, social fragmentation, and epistemic polarization. We are not spectators to an independent cosmos but participants whose observation and action matter ontologically. The world was not given complete and determinate but emerges through our engagement with it. Both traditions insist on disciplined practice, correct intention, and recognition of objective patterns as the conditions of genuine engagement—rejecting both the passive spectator who merely observes and the solipsistic projector who treats reality as raw material for subjective will.

Rethinking the Comparative Method

The analysis pursued here suggests a revised approach to comparative theology and philosophy of religion. Rather than seeking historical influence

between traditions or identifying shared ontological commitments, I have focused on structural resonances—the ways different traditions develop functionally analogous solutions to similar existential and metaphysical problems. The resonance between Lurianic and Vedic cosmogonies lies not in shared doctrinal content but in parallel articulations of observer-instantiated reality. Both traditions understand creation as beginning with withdrawal or negation rather than positive emanation; cosmogonic rupture as structurally necessary for plurality and consciousness; divine knowledge as incomplete and requiring human mediation; human consciousness as cosmologically essential; and observation as ontologically constitutive rather than merely epistemologically revealing.

Wolfson's apophatic challenge has proven not a refutation but an enrichment: by pressing us to distinguish the divine-side account of *tsimtsum* (disclosure through concealment) from the creaturely-side account (observational enabling), it has produced a more precise articulation of the framework. Valabregue-Perry's correction regarding Ein Sof as "integrative multiplicity" has sharpened rather than undermined the comparison: if both Ein Sof and the Rigvedic primordial state are inexhaustible plenitudes with immanent but inexplicit plurality, the structural parallel is more exact, and the conceptual movement from inexplicit to explicit differentiation is shared more precisely across the comparison.

Conclusion: Toward a Theology of Recursive Witnessing

This article has argued that Lurianic Kabbalah and Rigvedic cosmogony articulate structurally homologous accounts of observer-instantiated reality. Both traditions begin cosmogony with withdrawal or negation (*tzimtsum*, *nāsadāsīn no sadāsī*) that creates observational capacity rather than substantial content. Both proceed through a generative rupture (*shevirat ha-keleim* as an intra-divine event initiating material creation, *kāma* as the arising of relational intentionality) that establishes plurality and the subject–object distinction necessary for consciousness. Both inscribe epistemic instability within their narratives, acknowledging that even divine knowledge is incomplete. Both position human consciousness as cosmologically essential, participating in cosmic maintenance (*tikkun*, *yajña*) through observational and intentional engagement specified by practice traditions of remarkable technical precision (*kavanah*, *hitbonenut*, *devekut*; *saṅkalpa*, *dīkṣā*, *rta*).

More fundamentally, both traditions articulate "recursive witnessing"—the recognition that observation is not unilateral but mutual, that every observer is simultaneously observed, that consciousness and reality co-constitute each other in an ongoing process without absolute origin or final completion. This understanding challenges substantialist metaphysics, problematizes the subject–object binary, and positions knowledge as participatory rather than absolute. It further grounds an ethic of observation in which how we attend

to reality—whether with the *kavanah* of the Kabbalist or the *saṅkalpa* of the *yajamāna*—shapes what reality becomes.

The Rigveda asks: *ko addhā veda*—who really knows? Lurianic Kabbalah responds: no one, finally, because knowledge is always produced from within the fragmented cosmos it seeks to understand. Both traditions thus invite not certainty but participation—recognizing ourselves as observers embedded within the recursive structure of reality observing itself into being. In our contemporary context of ecological crisis, social fragmentation, and epistemic polarization, these ancient cosmologies offer a timely and philosophically demanding insight: we are not spectators to an independent cosmos but participants whose observation and action matter ontologically. The cosmos is not complete without us; our attention is not incidental to what the world is.

Competing Interests

The author declares that they have no competing interests.

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Distributed Rituals: Web3 as an Emergent Field of Digital Religion

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Web3 ecosystems represent an emergent field of digital religion where decentralized infrastructures—spanning smart contracts, token economies, and symbolic interfaces—actively generate novel forms of ritual life. These rituals, deeply embedded in algorithmic processes and economic incentives, cultivate collective identities, symbolic hierarchies, and affective economies marked by hope and betrayal. To interpret these dynamics, this article proposes distributed rituals analysis (DRA), a comprehensive framework synthesizing lived religion, ritualization theory, and actor-network theory. Drawing on eighteen months of ethnographic engagement across diverse Web3 communities—including non-fungible tokens, decentralized autonomous organizations, and staking protocols—I illustrate how decentralized practices become ritualized through temporal orchestration, symbolic differentiation, and distributed agency. Reflexive participation further reveals the researcher's complex positionality as both observer and participant. DRA provides conceptual and methodological clarity for exploring emergent rituals in decentralized environments, illuminating how digital infrastructures reconfigure sacredness and collective meaning-making. This framework also lays the groundwork for future comparative inquiries into ritual forms across decentralized and hybrid spaces.



Introduction

The emergence of Web3—a decentralized ecosystem of blockchains, token economies, and autonomous communities—marks a profound shift in how digital participation is organized and experienced. In this article, Web3 is understood as a distributed socio-technical field characterized by wallet-based identities, ledgered states, programmable incentives, and composable on-/off-chain interfaces. Unlike Web2 platforms, governed by centralized authorities and database-centered content curation, Web3 infrastructures distribute agency across cryptographic protocols, smart contracts, and collective governance. This distribution unsettles conventional boundaries of sacredness and meaning-making, shifting attention from institutional centers to interface-mediated circulation. These very shifts locate Web3 squarely within the evolving purview of digital religion, extending its long-standing concerns—sacred space, ritual, and belief—into the distinct lens of decentralization.

While scholars of digital religion have explored how established traditions adapt to digital environments (Campbell 2013; Grieve 2013), little systematic attention has been paid to how decentralized systems cultivate ritual forms. This article asks how distributed infrastructures mediate and stage emergent rituals, affective economies, and symbolic hierarchies.

The purpose is not to pathologize these practices as speculative mania or romanticize them as utopian liberation but to examine how decentralized systems afford new possibilities for ritual life. To address this question, I propose distributed rituals analysis (DRA)—a conceptual framework integrating lived religion, ritualization theory, and actor-network theory (ANT).

Drawing on eighteen months of ethnographic immersion across diverse Web3 communities—including non-fungible tokens (NFTs), decentralized autonomous organizations (DAOs), and staking protocols—I show how decentralized practices become ritualized through temporal orchestration, symbolic differentiation, and distributed agency. Practices such as daily check-ins, staking cycles, Discord initiations, and collective airdrop anticipation are not merely transactional; they enact shared cosmologies of time, hierarchy, and affect.

DRA offers theoretical clarity and methodological tools for examining how rituals emerge in decentralized contexts—and how infrastructures participate as nonhuman actants in sacred world-making. The following sections outline the relevant literature, present the theoretical foundations of DRA, and analyze five ritual dimensions of Web3: time, space, agency, hierarchy, and affect. A reflexive note concludes the analysis, highlighting the researcher's situated role in coproducing the ritual field.

Literature Review

Digital Religion

Over the past three decades, the study of digital religion has matured into an interdisciplinary field examining transformations in religious authority, ritual

practices, and symbolic boundaries within online spaces. Early scholarship framed cyberspace as potentially sacred (O’Leary 1996), moving beyond conceptions of the internet as merely a neutral medium. Christopher Helland (2000) introduced a pivotal distinction between “religion online”—the digital dissemination of religious content—and “online religion,” emphasizing digital spaces as active sites of ritual and community formation. Heidi A. Campbell (2013) further refined this typology, highlighting hybrid forms of religious practice that transcend simple online/offline binaries. Subsequent research has coalesced around key analytic clusters, including the reconfiguration of identity and embodiment (Lövheim 2013), the dynamics of agency and authority (Hoover 2016; Campbell 2021), and the formation of sacred space and ritual practice (Hutchings 2017; Evolvi 2022). More recent contributions by Campbell and Gregory Price Grieve (2014) and Campbell and Ruth Tsuria (2022) have extended these analyses across diverse digital platforms, such as gaming environments and mobile apps, while Campbell (2024) has advocated greater theoretical flexibility to accommodate emerging technologies.

Despite these advancements, the field remains predominantly anchored in Web2 contexts—centralized, institutionally governed environments. The rise of blockchain-based Web3 systems, marked by decentralization, collective governance, and protocol-driven interaction, invites a reassessment of assumptions about centralized mediation. Few scholars have systematically explored how Web3’s decentralized architectures—cryptographic protocols, token economies, and autonomous governance structures—reconfigure religious and symbolic dynamics. Meng Yoe Tan’s (2016) innovative application of ANT—a framework that foregrounds interactions among human and nonhuman actants—to question online authenticity hints at methodological potentials for analyzing protocol-mediated settings. Nevertheless, decentralized digital religion remains underexamined, a gap that the present article’s DRA is designed to address.

Ritual in Digital Environments

Parallel to digital religion scholarship, ritual studies have investigated how digital technologies reshape the temporal, spatial, and affective dimensions of symbolic actions. Catherine Bell’s (2009) influential theory of ritualization—defining ritual as strategically differentiated practices achieved through repetition and symbolic framing—remains foundational. Subsequent research demonstrates digital platforms’ capacities to embed ritualization directly into interface affordances (design features enabling specific user interactions), fostering practices such as daily check-ins, hashtag activism, and livestream ceremonies (Campbell and Bellar 2023; Knott 2005). Suzanne Van der Beek and Martin Hoondert (2019) further document diverse digital rituals, including online storytelling and virtual memorials, underscoring how new media actively co-construct symbolic worlds.

Significantly, scholarship increasingly recognizes digital ritual as not merely the digitization of existing practices but an emergent phenomenon deeply shaped by technological affordances. Yet, most studies remain confined to explicitly religious or spiritual platforms. In contrast, decentralized Web3 environments—characterized by smart contracts (self-executing digital contracts), tokenized interactions, and distributed temporal rhythms—represent novel contexts where rich ritual dynamics emerge independently of explicit religious doctrines. The absence of robust analytical tools capable of identifying rituals beyond doctrinal cues represents an epistemological limitation that the DRA framework specifically addresses.

Web3 as a Ritual Field

Web3 infrastructures—including blockchains, NFTs, DAOs, and staking protocols—extend far beyond mere technical innovation. These infrastructures function as symbolic architectures actively mediating social belonging, collective memory, hierarchical differentiation, and repetitive action. Preliminary ethnographic research has begun exploring how cycles of scarcity, status roles, and participation rituals evoke quasi-religious affective intensities (Swartz 2017). Nonetheless, comprehensive theoretical engagement remains sparse. Even foundational accounts, such as Finn Brunton's (2019) history of digital cash and Lana Swartz's (2020) exploration of payment systems, predominantly interpret symbolic behaviors economically or communicatively rather than ritualistically.

Some emerging public discourse analogizes cryptocurrency behaviors, such as Bitcoin “hodling,” to religious devotion (Laycock 2022). However, these discussions have not yet been systematically explored in scholarly literature. To date, no systematic theoretical framework exists for rigorously analyzing ritual dynamics specific to decentralized digital environments. The proposed DRA addresses this gap by integrating insights from lived religion, ritualization theory, and ANT to analyze how decentralized networks coproduce ritualized agency, emotional economies, and symbolic orders. In doing so, DRA explicitly extends classic digital-religion concerns with negotiated authority and agency (Campbell 2021; Hoover 2016) from the centralized platform logic of Web 2 to the decentralized protocol logic of Web3, where authority and agency—once negotiated mainly among users, leaders, and platforms—are now redistributed across smart contracts, validator nodes, and algorithmic protocols, introducing nonhuman actants into the sacred negotiation itself. This shift specifies how infrastructural mediation (contracts, wallets, bots) reshapes participation and ritual efficacy. By positioning Web3 as a distinctive ritual field, the DRA framework thus opens new avenues for comparative research across religious studies, anthropology, and the philosophy of technology. In this light, the ritual dynamics of Web3 appear as a consequential intensification and redistribution of digital religion's core concerns across the novel sociotechnical terrain.

Theoretical Framework

This article builds on three interrelated theoretical traditions—lived religion, ritualization theory, and ANT—to formulate a robust framework for analyzing how emergent ritual forms take shape in Web3 and how code-based infrastructures co-perform and mediate affective economies. The integration of these particular theories is specifically chosen for their complementary capacity to illuminate embodied practices, symbolic differentiations, and distributed technological agencies central to decentralized digital environments. Each tradition contributes a distinct analytical lens, while their synthesis grounds what I describe as DRA.

Lived Religion

Lived religion provides a foundation for understanding how everyday practices acquire sacred significance beyond institutional settings (Ammerman 2014; McGuire 2008). Nancy Ammerman argues that religion is often experienced through everyday actions and negotiations within social and material contexts rather than strictly through formal doctrines. This perspective is particularly valuable for examining Web3, where sacredness emerges through iterative behaviors like staking tokens, minting NFTs, and maintaining interaction streaks rather than through explicit religious teachings or authorities. While most lived religion scholarship has focused on embodied practices within everyday physical environments, decentralized digital infrastructures like Web3 represent novel sites for extending its analytical scope. Building on Ammerman and Meredith B. McGuire, lived-religion analysis foregrounds patterned practice, material mediation, and situated negotiation of meaning; in decentralized settings, this lens travels well: wallet-based selves, signatures, and everyday schedulers become mundane sites where sacrality is iteratively made legible—through repetition, minor sacrifice (e.g., gas), and ethical calls in gray zones. We use “ritual” analytically (Bell 2009; Ammerman 2014), without presuming emic religious labeling by participants.

Ritualization

Ritualization theory emphasizes how specific actions become symbolically differentiated through repetition, strategic framing, and embodied competence (Bell 2009). Catherine Bell’s framework highlights that ritualization is not merely symbolic; it actively constructs and reinforces communal identities, hierarchies, and social distinctions. Bell’s insight that ritualization is a strategy of power and distinction is particularly relevant, as Web3 interfaces and token economies ritualize participation in ways that reinforce social stratifications. In Web3, ritualization appears through practices such as daily check-ins, token snapshot events, and gamified leaderboards, all of which strategically differentiate participation from routine activities, generating symbolic and affective resonance within decentralized communities.

Actor-Network Theory

ANT, particularly as advanced in recent scholarship (Couldry and Hepp 2017; Latour 2005), underscores how agency is distributed across networks of human and technological actors, often described as associations (and, in some contexts, assemblages). Assemblages refer to networks composed of heterogeneous elements—human, technological, and symbolic—that collectively produce distinct social and cultural effects. ANT clarifies that ritual practices in Web3 spaces are coproduced through dynamic interactions involving not only human actors but also smart contracts, bots, wallets, and cryptographic protocols. Crucially, ANT names the mechanisms of distribution: nonhuman actants are enrolled, scripts translate intentions, and mediations carry action across links. In Web3, contracts inscribe temporal hinges (resets/snapshots), bots gate spaces and render status legible (roles/leaderboards), and wallets carry trajectories across interfaces. Treating these artifacts as actants clarifies why ritual efficacy here rests on associations—constantly renegotiated ties among people, code, and interfaces—rather than any single institutional center. Through this lens, ritualization itself becomes a distributed accomplishment—an emergent effect of translations among heterogeneous actants rather than a scripted sequence performed by human agents alone.

Towards Distributed Rituals Analysis

These theoretical perspectives collectively form DRA, a comprehensive analytical approach designed explicitly for exploring ritual dynamics in decentralized digital environments. DRA does not assume rituals to be merely symbolic or purely instrumental but identifies them as emergent phenomena that blend technological affordances, symbolic significance, and economic motivations. Furthermore, DRA remains methodologically flexible, applicable across diverse research contexts, including participant observation, computational ethnography, and archival analysis. By situating decentralized rituals within distributed associations of human and nonhuman actants, DRA enables comparative inquiry across digital and hybrid contexts without collapsing analytic distinctions between mediation and performance.

Methodology

This article adopts a qualitative design—digital ethnography with participant observation and reflexive co-inhabitation—to trace and describe emergent ritual dynamics in Web3. For the purposes of this article, “Web3” is operationalized as a distributed socio-technical field marked by wallet-based identities, ledgered states, programmable token incentives, and composable on-/off-chain interfaces that render participation observable. Over eighteen months—November 2023–May 2025—I embedded across decentralized ecosystems, tracing participation through testnet/mainnet phases and both incentivized/non-incentivized

settings. The focus was not on isolated forums but on moving with people across the interfaces (e.g., cross-project dashboards, campaign tools like Galxe or Zealy) and social channels (Discord, Telegram, X, Farcaster) that collectively make a community legible to itself. This design supports a processual account of how ritual forms stabilize and circulate across distributed infrastructures.

Rather than preselecting isolated platforms, I followed the field as it moved—with people, across interfaces, and along recurrent ritual rhythms. Inclusion was salience led and event driven: scenes entered the archive when participation visibly condensed (e.g., onboarding waves, quest cycles, claim/reveal windows) and could be documented across the five analytic dimensions. Initial exclusion applied where access hinged on private direct messages or where documentation would compromise community or legal norms. Midstream exit was recorded when campaigns or testnets ended, when eligibility shifted (e.g., airdrops newly conditioned on staking), when credible scam signals emerged, or when access newly required unverifiable credentials.

The corpus spans fifty to sixty projects across diverse functional domains—DAOs, decentralized social platforms, NFT markets, AI/agent ecosystems, DeFi, DeSci, DePin, and L1/L2 networks—sampled over an eighteen-month window. Materials include more than 500 screenshots, chat transcripts, participation logs, and thick fieldnotes. Critically, the archive was indexed not only by project and ritual/interaction type (e.g., onboarding, quests, airdrops, claims) but also by the five analytic dimensions central to this article: time, space, agency, hierarchy, and affect. This multidimensional indexing enables iterative, cross-case analysis of how these elements are co-performed within ritual sequences. Primary interactions were conducted in English, with sustained, direct participation in Persian and Turkish communities; additional episodic engagements in Malay, Indonesian, Filipino, Urdu, Hindi, and other languages were supported by translation tools.

Public chat transcripts and comment threads were treated as situated participant accounts. Short anonymized verbatim snippets (or close paraphrases) are included in the findings to reflect how participants themselves framed obligation, thresholds, timing, status, and feeling—regardless of whether they named these practices “religious.” These emic traces were read through an analytic distinction central to DRA: ritualization is examined as a process emergent from practice and infrastructure. The stance is interpretive rather than confessional—aimed at tracing how meaning is organized, not how it is professed.

Analytically, I used a structured thematic approach guided by the five core dimensions. Rather than fixing static codes, I traced how time, space, agency, hierarchy, and affect co-appeared and shifted across the lifecycle—from onboarding through to routine participation and to peak events (e.g., airdrops) that recalibrate status and intensify feeling. Reading scenes in relation to phase/regime (testnet versus mainnet, incentivized versus non-incentivized) and interface/channel (campaign or on-chain dashboards versus social chat) kept the

account processual and infrastructural: decentralized systems stage and mediate ritual action. Given volatility and context dependence, manual, context-sensitive structuring—supplemented by brief, reflexive memoing—was preferable in this field to software-driven coding.

Positionality and Reflexive Co-inhabitation

My stance—developed in a later section as “the Researcher as Pilgrim”—moved between observer, participant, and at times co-participant/facilitator. This reflexive co-inhabitation was not a limitation but an epistemic commitment: in fluid, pseudonymous publics, embodied experience is a primary lens for analysis (Pink et al. 2016; Boellstorff 2008). As I navigated countdowns and epoch resets (time), token-gated rooms and role colors (space/hierarchy), strategic choices of participation and restraint (agency), and the pull of gains and disappointments (affect), these frictions became integral to inquiry. The stance acknowledges knowledge in Web3 as situated and coproduced.

Ethical Considerations

Decisions concerning consent, anonymity, and data security were guided by the ethical principles outlined in the Association of Internet Researchers guidelines (AoIR 2019). Data were drawn from public channels; limited semi-public or token-gated access occurred via ordinary community participation. No private communications were accessed or quoted. Publications include no personally identifying information; analytic screenshots were curated or masked to remove handles and user-generated content. All materials are stored in encrypted form. References concern project names, public rituals, and platform-level features only.

Credibility rests on cross-case comparison and triangulation across platforms and languages; claims aim for analytic generalization, not statistical inference. The design was calibrated to trace how time, space, agency, hierarchy, and affect interlock across heterogeneous Web3 projects.

Discussion

Web3 as a Ritual Field: Conditions of Ritualization in Distributed Environments

The emergence of Web3 represents not merely a technical innovation but the crystallization of a new cultural and social milieu—a ritual field constituted by decentralized infrastructures, symbolic economies, and affective participation. Core concerns in digital religion—identity, authority, mediation, and sacred time/space—have long preoccupied the field. In this respect, digital religion has already theorized how online mediation and material infrastructures ritualize practice and contour sacred boundaries (Evolvi 2022), and the present account extends that line of work into decentralized architectures. Yet Web3, best read as the distributed outgrowth of the social web, brings a different technical grammar: wallet-based identities, ledgered states, programmable token

incentives, and composable on-/off-chain interfaces. These affordances do not merely add another channel; they reconfigure the conditions under which symbolic value, trust, and communal recognition are produced.

The notion of Web3 as a ritual field requires theoretical justification. Bell (2009) defines ritualization as a strategic mode of action, differentiating particular behaviors from ordinary practices through repetition, spatial-temporal framing, and embodied competence. Drawing on Bell, Web3 communities strategically ritualize participation by building repetition, spatial-temporal framing, and embodied competence into protocols and interfaces. Daily check-ins, token-staking rituals, periodic snapshots, epochal events, and governance cycles all exemplify these ritual dynamics embedded within decentralized protocols.

Crucially, Web3 ritualization diverges markedly from centralized Web2 platforms where meaning-making was platform centered and curator driven. Decentralization introduces a tension between authority and agency: authority becomes algorithmic, fragmented across nodes and consensus mechanisms, while individual agency is enacted through participation in distributed networks rather than submission to hierarchical governance. The result is a ritual environment where participants become subjects of algorithmic pacing/gating and agents of distributed enactment.

Moreover, this ritualization occurs without the explicit theological or cosmological frameworks traditionally associated with organized religion. Instead, meaning emerges through the interplay of infrastructural affordances, economic incentives, and affective investments—what I term an emergent economic cosmology. This concept captures how shared imaginaries around value, participation, and future potentialities imbue activities like staking tokens, claiming NFTs, or participating in governance with symbolic resonance that exceeds instrumental rationality. While these rituals may appear secular, they mobilize forms of belonging, temporality, and commitment akin to religious practice. Should traditional religious institutions engage with these environments in the future, their ritual logics may intersect with—rather than replace—the emergent sacred grammars of decentralized culture.

Victor Turner's (1977) concept of liminality further clarifies how decentralized spaces facilitate this mode of ritual participation. Web3 communities frequently occupy liminal states—periods between token snapshots, pre-airdrop intervals, waiting times for token unlocks—characterized by heightened anticipation, uncertainty, and communal solidarity. These intervals serve as temporal thresholds, constructing spaces of ritualized suspense and collective expectation. Such liminal episodes are neither purely technical nor merely economic; rather, they become charged with symbolic resonance and emotional intensity. They embody Turner's notion of "communitas," a spontaneous and unstructured sense of collective solidarity that emerges in liminal intervals (see also van Gennep [1909] 1960).

Drawing on Bruno Latour's (2005) ANT, we can further recognize that the ritual dimensions of Web3 extend beyond human actors alone. Following ANT, nonhuman actants—smart contracts (self-executing digital contracts with predefined rules executed automatically), wallets, bots, and dashboards—take part in ritual formation: contracts inscribe temporal hinges (snapshots/resets), bots gate access and render status legible (roles/leaderboards), and wallets carry trajectories across interfaces. For instance, the distribution of roles within Discord servers, governed by bots that track user activity and participation streaks, exemplifies how nonhuman actors enact and sustain ritual hierarchies. ANT's insight—that agency is distributed across human and nonhuman actants—illuminates how technological infrastructures participate in ritual formation.

In summary, Web3 as a ritual field operates through conditions of decentralization, ritualized repetition, symbolic differentiation, liminality, distributed agency, and emergent affective communities. It constitutes an ecology of participation where economic, technical, and symbolic layers merge seamlessly, producing forms of collective experience that resonate with traditional religious and ritual practices. Understanding Web3 as ritual thus necessitates a theoretical and analytical framework capable of capturing these distinctive configurations. This article introduces DRA precisely to articulate and analyze this novel ritual ecology, foregrounding the interplay between lived religious experience, ritualization processes, and actor–network entanglements.

Time: The Architecture of Sacred Temporality

In Web3, time is never simply linear or incidental; rather, it functions as an orchestrated choreography that delineates sacred intervals, ritualized durations, and collective cycles of anticipation. Decentralized environments encode time through precise computational rhythms, embedding it deeply into their technological infrastructure. These temporal cycles are not mere scheduling conveniences—they are affectively charged intervals that shape collective participation and communal identities.

One prevalent temporal structure is the “daily check-in,” a seemingly simple action that carries significant symbolic weight. Daily claims, recurring precisely at the UTC reset (midnight UTC, the field's common temporal hinge), epitomize the kind of temporal discipline Bell (2009) characterizes as ritualization—a strategic differentiation of activities from the ordinary flow of life. Throughout my fieldwork, I observed and participated in numerous daily rituals, each punctuated by the collective urgency to validate presence, maintain streaks, and secure future rewards: “Don't miss your daily tasks today!” In many projects, missing even a single day risked forfeiting hard-earned progress across multiple days. For instance, in many Web3 projects, participants were encouraged to complete daily check-ins over a seven-day cycle, where uninterrupted sequences led to increasingly valuable symbolic and economic

rewards. The anxiety of potentially “breaking the streak” was widespread—on Telegram, community members would routinely remind one another with urgency, emojis, and countdowns: “Don’t break your streak—UTC reset got me yesterday.” In some communities, curated task lists were even shared to help ensure ritual continuity.

These daily rituals echo traditional religious temporalities, which similarly divide time into profane and sacred intervals, requiring sustained vigilance and punctual observance. While religious traditions often anchor such observances within cosmological narratives or divine commandments, Web3 infrastructures situate them within algorithmic mechanisms. The code itself becomes a secular oracle, determining participation eligibility, reward distribution, and even community status. For instance, Mint Blockchain integrates visual and symbolic markers—such as a virtual “tree” that requires daily watering—to materialize temporal fidelity. A visible streak escalation attaches urgency to routine, the narrow claim window concentrates presence, and the small but persistent gas spend folds a minor sacrifice into keeping time. Participants not only compete to preserve personal streaks but engage in symbolic acts of “stealing water” from others. This introduces a morally charged dimension to temporal participation, where actions become symbolically meaningful and socially consequential. Debates within community chats reflected genuine moral deliberations about fairness, obligation, and symbolic transgression: “Is stealing water from others okay? Or is it morally wrong?” Such conversations reveal how deeply participants internalized the ethical implications of temporally structured practices.

Beyond daily rituals, Web3 temporalities extend into longer and more dramatic cycles, such as seasonal events, epochal snapshots (defined intervals in blockchain systems when specific events, such as reward distributions, occur), and token unlock schedules. These are not merely technological events; they serve as liminal thresholds—times of heightened collective anticipation, uncertainty, and communal solidarity. Turner’s (1977) notion of liminality is particularly instructive here: these temporal moments suspend participants in a state of ambiguous expectation, fostering profound emotional engagement. In many decentralized projects, such epochal or phase-based transitions are accompanied by community countdowns, collective speculations, and strategic positioning. When such key moments arrive—whether marking the end of an epoch or the culmination of an airdrop cycle—communities often respond with heightened emotional expression, including messages of congratulations for those who qualified or succeeded. Such snapshots are not merely database updates; they function as communal rites of passage, marking collective transitions from uncertainty to fulfillment, or occasionally disillusionment. In Mocaverse, many tasks run on a replenishing points pool—functionally first-come, first-served: once the pool empties, participants wait for an uncertain recharge; scarcity disciplines timing as much as desire.

Additionally, time in Web3 is intricately connected to economic outcomes, producing an “economic cosmology” in which future rewards sanctify present actions. Actions undertaken in the present are primarily justified and valorized through anticipated future returns, transforming the concept of delayed gratification into a quasi-religious ethos. Practices such as holding tokens (“Hodling”), staking assets, and committing to long-term engagements become morally significant acts akin to traditional religious practices of sacrifice and abstention. Read through lived religion (Ammerman 2014; McGuire 2008), these routinized disciplines and minor sacrifices render sacrality ordinarily legible, weaving it into the daily fabric of waiting, maintaining, and investing.

Furthermore, the technical architecture of blockchains materializes temporality in the stack: Ethereum’s block time (average interval between block production), Cosmos-style epoch timers (e.g., the x/epochs module), and tokenomics schedules together operate as what I term a “distributed calendar” that schedules eligibility, windows, and resets with algorithmic precision. Read through ANT (Latour 2005) this entanglement becomes legible, time is not merely observed by humans; it is co-organized through associations of human and nonhuman actants. Smart contracts write temporal hinges (snapshots, claim cut-offs); bots and schedulers automate vigilance around resets; gas fees (transaction fees users pay for executing transactions and smart contracts on the blockchain) introduce micro-frictions that thicken or thin the pace of action; and wallets carry participation across interfaces. My own engagement explored the temporal affordances and automated dynamics of these environments. On select occasions, I used lightweight timing automation to randomize participation windows and subtly jitter the spacing between actions. These actions ritualized my participation into a complex dance between human intention and machinic precision.

In sum, sacred temporality in Web3 emerges as a complex interplay between infrastructural affordances, collective affective engagement, economic motivations, and symbolic differentiation. Time becomes a shared sacred resource, continuously renewed and contested, structuring belonging through rhythmic precision and emotional intensity. The distinctive temporal architecture of Web3 thus reveals how ritualization processes in decentralized spaces engender emergent forms of sacredness not reliant on theological frameworks but rather produced through algorithmic mediation and collective practice.

Space: Interface as Ritual Habitat

In decentralized environments, space is neither neutral nor simply digital; rather, it manifests as an intricately layered ritual habitat, a symbolic terrain where ordinary interactions transcend functional transactions, transforming into deeply meaningful acts of symbolic engagement. Building on the established understanding that digital platforms can constitute sacred space (Hutchings 2017), we see that in Web3, interfaces—project dashboards,

Discord servers, staking platforms, token-gated channels—function as liminal sites, simultaneously material and imagined, technical yet ritualized, where participants collectively navigate between everyday digital interactions and heightened symbolic experiences.

Throughout my ethnographic engagements, I observed how decentralized spaces have been carefully crafted to cultivate ritualistic engagement, embedding symbolic dimensions directly into their interface designs. For example, the Mint Blockchain project, previously discussed in relation to temporality, exemplifies how interfaces became ritual habitats. The visual representation of a virtual tree and the moral dimensions of actions like “stealing water” endowed the dashboard with symbolic depth, transforming routine participation into meaningful spatial engagement. A different spatial grammar appears in Mocaverse, which renders “habitat” through a points-pool logic. Tasks appear with a visible pool bar for Realm Points (RP); once the pool drains, latecomers risk missing the claim until the pool is unpredictably refilled. Formally, tasks carry generous deadlines (e.g., “open until 9 April”), but practically, the space feels FCFS-like because the pool can empty at any moment. Participants attune to the interface as a moralized map: move now or lose your share. This calculus was voiced in community chats, with users noting “Pool’s empty—my grind to level-100 takes ~4–5 days; now what?” and urging others, “Start today so when tasks end the pool hasn’t dried.”

The concept of “ritual habitat” draws on Knott’s (2005) spatial analysis of religious practice, which emphasizes how sacred space is continuously constituted and reconstituted through symbolic differentiation and ritual engagement. Applying this framework to Web3, we see interfaces as sites of ongoing differentiation, where ordinary spaces become ritually significant through symbolic boundary-making. Participants enter a dashboard or Discord channel not by simply clicking a link but by crossing a threshold—connecting a wallet, verifying identity, or holding specific tokens—each act constituting a digital rite of passage. Hutchings (2017) further emphasizes the interplay of digital spaces, community formation, and ritual practice, underscoring how online environments actively produce sacredness through structured interactions. Read through lived religion (Ammerman 2014; McGuire 2008), it is in these routine acts of crossing—of authenticating, holding tokens, and gaining entry—that the sacred is produced and negotiated, one access gate at a time.

In several projects, tiered rooms and restricted channels partitioned an otherwise flat network; doors opened as roles accrued or assets were linked, teaching users to read the interface as interior topography. The point here is spatial: thresholds actively draw rooms, even before any explicit hierarchy is named.

Moreover, the technical affordances of blockchain ecosystems and their graphical user interfaces actively shape and structure ritual participation. For instance, in the Portal project, Twitter itself became a ritualized interface, with hashtags serving as tokens of participation and posts becoming markers of

ritual engagement. Users strategically employed hashtags (#Portalcoin) as digital amulets aimed at maximizing visibility and symbolic capital within the ritual economy of attention and influence. Observations of participants intensely negotiating interactions highlighted how interface affordances—visibility metrics, engagement algorithms—structure symbolic interactions into rituals of reciprocal obligation. “gm [good morning] with #Portalcoin so it counts.”

Furthermore, these digital habitats are inherently ephemeral and precarious, constantly vulnerable to disruptions—server shutdowns, project rug pulls (crypto scams in which founders abandon a project after collecting user investments), account suspensions, or the sudden banning of participants who breach norms. This precarity enhances rather than diminishes their ritual significance, resonating with Turner’s (1977) analysis of liminal spaces. Discord servers and token-gated channels exist as liminal realms—suspended between permanence and dissolution, fostering communal solidarity through shared uncertainty. “spoke up and got kicked—doors shut instantly.”

Latour’s (2005) ANT further illuminates how interfaces in Web3 operate as co-constitutive networks, entangling human participants and technological actants into ritual formations. Smart contracts, wallet signatures, role-assignment bots, and visual indicators of status within interfaces are not passive tools but active mediators of ritual interaction. For instance, role-assignment bots within Discord automatically grant symbolic titles—such as “Verified,” “Ambassador,” or “Booster”—based on user interactions, time spent, and contributions made. Such automated rituals profoundly shape communal experience and hierarchy, indicating how nonhuman actors participate directly in symbolic space-making.

These interfaces thus become more than technical mediums; they embody ritual architectures that structure participation, delineate hierarchies, and generate symbolic meaning and affective investment akin to traditional ritual sites such as temples, churches, and pilgrimage destinations. However, unlike traditional religious spaces, decentralized interfaces rarely appeal to cosmological or metaphysical narratives. This emergence of sacredness through distributed technology reveals an entirely new mode of ritual habitation—one characterized by immediacy, algorithmic mediation, and collective imagination.

In sum, Web3 interfaces do not merely support ritual behavior—they actively constitute ritual space. Participants navigate these digital habitats as symbolic terrains charged with moral, affective, and hierarchical significance. Such spatial rituals reveal how decentralized environments enable emergent forms of sacredness that are distinctly digital yet resonant with enduring human practices of symbolic differentiation, boundary-making, and communal transcendence.

Agency: Multitudes of the Self

Agency within Web3 environments emerges as inherently plural and fragmented, transcending conventional notions of singular, unified identity. While digital religion scholarship has long established that identity is constructed, performed,

and mediated online (Lövheim 2013), Web3 architectures reconfigure this process. Decentralized platforms offer unique affordances that enable—and even encourage—participants to engage through multiple identities, wallets, and strategies, producing an environment in which agency is constantly negotiated, enacted, and multiplied. This multiplicity aligns closely with insights from ANT (Latour 2005), conceptualizing agency as distributed across human and nonhuman actants, effectively destabilizing conventional assumptions about individual intentionality and control.

During fieldwork, I experienced this fragmented agency firsthand. As part of immersive participant observation, I adopted diverse participation modes, including at times parallel digital identities. This was not mere duplicity but a methodologically grounded response to the algorithmically governed incentive structures. On select occasions, I used lightweight timing automation to randomize participation windows and subtly jitter the spacing between actions to mimic human cadence. I ritualistically enacted distributed agency across interwoven digital selves. This experience underscored how what looked like routine transactions became a choreography of selves: agency distributed across interfaces, addresses, and timed prompts then braided back into a single researcher-participant.

Such distributed multiplicity, however, is not universally celebrated. Within Web3 communities, ethical debates surround multi-accounting (one individual using multiple accounts on digital platforms) and automation strategies. Discord conversations frequently erupted into moral arguments, reflecting collective ambivalence about ethical boundaries of agency. Comments like “This is haram and absolutely forbidden—you are just exploiting the system” contrasted with defenses such as “We are stress-testing their systems and exposing design flaws. This is part of helping them grow—testnets are meant for this. Better now than after launch.” These frictions signal a moral economy of agency: communities negotiate where disciplined participation ends and gaming the system begins.

Decentralized agency further unsettles conventional notions of selfhood, enabling identity to operate as a modular and programmable construct. Within networked assemblages, each wallet, account, or pseudonymous persona acts as a semi-autonomous node—connected not through continuity of self, but through converging strategies and intentionalities. In certain project ecosystems, particularly during gamified testnet phases, maintaining multiple accounts or identities becomes a strategic response to algorithmically tiered reward systems. Roles such as “Testnet user” or “OG” are not merely functional but status-bearing signifiers—markers of symbolic capital within community hierarchies. In this context, identity is not fragmented by accident or deception, but ritualistically dispersed across interfaces, wallets, and behavioral patterns. Multiplicity thus emerges not as ethical breach but as structured participation: an enacted mode of being shaped by the logic of the system itself.

The “mining campaign” in *Mocaverse*—where participants farmed shards for a lottery-based token presale—made this logic starkly visible. Fieldnotes and community discussions repeatedly underscored a widespread participant strategy. As one user advised others in a public Telegram channel, “You should join with other wallets too and become your own referrer. This way you get more shards from the referral system, and with more accounts, you have a better chance.” In such incentive-driven environments, the practice of multi-accounting becomes a rational calculus, ritualistically reframing distributed agency not as deviance but as disciplined participation. From a systems perspective, this user-generated multiplicity—regardless of individual intent—functions as both a measure of commitment and a key metric of growth for the projects themselves.

In ANT terms (Latour 2005), agency is co-composed; Ritual participation emerges through dynamic interactions among multiple actors, where non-human agents—bot scripts, wallet software, automated role-assignment mechanisms—actively shape and discipline human behavior. Employing bots to execute repetitive tasks like daily claims or token transfers ritualizes interactions, integrating machinic precision with human intentionality. In effect, automation can serve as disciplined devotion.

This multiplicity parallels religious traditions, where participants adopt ritual personas aligned with distinct functions and roles. Multiplicity demands constant reflexive navigation between sincerity and strategy. Operating multiple accounts involves navigating shifting identity markers—such as linguistic style and interaction patterns—within a system that simultaneously enables and scrutinizes multiplicity.

Moreover, agency in decentralized environments is profoundly shaped by infrastructural affordances and algorithmic structures. Blockchain networks enable, incentivize, and discipline participation through coded rituals—daily staking requirements, snapshot participation thresholds (specific blockchain moments capturing account statuses for reward allocation), or mandatory governance votes. These algorithmic mechanisms exert agency over participants, defining and constraining possibilities for meaningful action. The ritual dimension of agency extends beyond human intention, distributed across computational protocols, symbolic artifacts, and collective imaginaries.

In summary, agency in Web3 is fundamentally plural and fragmented, shaped by interactions among human participants, technical infrastructures, and symbolic economies. This ritualized multiplicity highlights how decentralized environments facilitate new configurations of agency—complex, contested, and inherently symbolic.

Hierarchy: Stratification in a Flat Cosmos

While Web3 promises decentralization, freedom from traditional authorities, and a flat organizational structure, decentralized communities in practice

are profoundly hierarchical. Far from eliminating distinctions, decentralized platforms actively produce and reinforce complex symbolic hierarchies—manifested through visual markers, status roles, token allocations (distribution of tokens to users as rewards or incentives for participation), and exclusive access privileges. This reconfiguration of authority into new, platform-driven forms resonates with central findings in digital religion, which document how media environments do not dissolve authority but rather necessitate its recalibration (Campbell 2021; Hoover 2016). This apparent contradiction—egalitarian ideals versus hierarchical practice—reveals deep insights into the symbolic logic and ritual dynamics of Web3 environments.

My ethnographic engagements provided ample evidence of how decentralized communities systematically embed hierarchies into their symbolic and technical infrastructures. Roles such as “OG” (Original Gangster), “Pioneer,” “Testnet User,” “Developer,” and “Ambassador” were omnipresent, carefully codified within Discord servers, project dashboards, and community rituals. These hierarchies are not merely symbolic; they structure access to privileged channels, insider information, and tangible economic rewards like preferential token distributions and exclusive NFTs (non-fungible tokens, unique digital tokens proving ownership of specific assets on blockchain).

The proliferation of hierarchical roles aligns closely with Bell’s (2009) theoretical insight into ritualization as a strategy of differentiation. Within Web3, symbolic differentiation emerges through visual badges, leaderboards, role assignments, and selective channel access, effectively distinguishing certain participants from the general community. Unlike centralized platforms where hierarchies are typically formalized through explicit organizational structures, decentralized environments embed distinctions into interfaces, automated role-assignment bots, and symbolic artifacts such as limited-edition NFTs. Hierarchy thus emerges as an algorithmically mediated ritual phenomenon, continuously reproduced through repeated interactions and sustained participation.

Over time, repetition and public recognition transmute mundane participation into affective capital—confidence, esteem, and attachment that bind. Roles formalize stratification; bots script graduated belonging; praise rituals and visible badges adhere pride to names. In Randall Collins’s (2004) terms, these are interaction ritual chains that generate durable emotional energy and emblems that motivate return; in Bell’s (2009), a continuous ritualization that sets this labor apart from ordinary chat—the slow accumulation of standing, enacted in small acts and seen in public mirrors.

In ANT terms (Latour 2005), hierarchy is co-composed: bots assign titles, contracts/checkers gate rooms, dashboards render status legible. In *Joltify*, earning Vanguard required sustained chat presence and helping newcomers (answering “how to activate X,” “how to do tasks,” etc.); metrics tallied activity, while moderators flagged “helpful” exchanges. A small circle of us decided

to pursue Vanguard together because the role carried higher airdrop weight; I was the last in our group to get it, and when it finally landed the channels lit up—congrats in the TR–FA local and the global rooms. “Bravo—Vanguard at last.” “Happy for you—take us with you.” The screen did the ceremony: color changed, door opened, and standing became visible.

These hierarchies actively shape social relations, community dynamics, and symbolic economies. For instance, in the Mint Blockchain project, leaderboards publicly displayed users’ cumulative scores derived from streaks, referrals, and completed tasks, fostering intense competition for symbolic visibility. Users meticulously monitored rankings, interpreting shifts in standings as reflections of personal dedication or moral failures. “Down 14 today—have to catch up before reset.”

Furthermore, Web3 hierarchies operate within an economic cosmology that imbues symbolic distinctions with direct financial implications. High-ranking community members gain preferential access to exclusive investment opportunities, private token sales, and insider information—benefits that translate symbolic status into concrete economic value. Across multiple projects, high rank or verified holdings routinely map to higher allocations and preferential access. In Mocaverse, holding the Moca NFT (rather than RP) conferred larger distributions and eligibility for select private token sales, while points signaled activity but did not govern those entitlements. Communities like Carv Protocol used token allocations as ritualized economic initiations, with higher-ranked members receiving larger distributions, reinforcing hierarchical status. Such rituals closely parallel traditional religious hierarchies where elders gain preferential access to sacred resources and knowledge.

Yet these symbolic hierarchies coexist paradoxically with the ongoing promise of decentralization, creating a state of symbolic tension. Turner’s (1977) notion of liminality clarifies this paradox: decentralized spaces sustain a liminal state where participants oscillate between egalitarian ideals and hierarchical aspirations. This tension generates powerful affective engagements: admiration, envy, competition, and occasional resentment. Discord interactions frequently showcased ambivalent sentiments—participants expressed both admiration and subtle jealousy towards privileged members. “Bro, take our hand too.”

Moreover, hierarchical rituals in Web3 continuously negotiate boundaries of inclusion and exclusion, symbolic purity, and transgression. Projects occasionally conducted ritualized removals of inactive or nonconforming members, reaffirming symbolic boundaries. Such exclusionary rituals resonated deeply with religious practices of excommunication or purification rites, underscoring the ritual potency embedded in symbolic hierarchies.

In conclusion, Web3 actively ritualizes hierarchy through technical affordances, symbolic artifacts, economic incentives, and collective practices. Despite promises of decentralization, symbolic distinctions remain embedded,

continuously reinforced through ritual engagement. This dynamic reveals how decentralized environments generate new forms of hierarchical sacredness, blending technology, economic value, and ritual practice.

Affect: Economies of Hope and Betrayal

Affect in Web3 communities is not merely a byproduct of interaction but a fundamental currency—deeply embedded into infrastructures, ritual performances, and economic incentives. Decentralized environments construct intricate affective economies where emotional engagements—hope, fear, anticipation, triumph, and betrayal—are ritualized, intensified, and systematically orchestrated. These emotional economies reveal how Web3 spaces transform technical interactions and economic transactions into profoundly ritualized affective experiences.

My findings render Sara Ahmed's (2004) "affective economies" concretely technical: which emotions adhere to which signs is not incidental but infrastructured—a function of eligibility scripts, pacing algorithms, and visibility metrics that time and rank participation. In this register, affect does not merely circulate between bodies and signs; it is routed through architectures that calibrate anticipation, legibility, and access—making attachment and detachment empirically traceable in interfaces and code.

Throughout my fieldwork, affective intensity was a pervasive reality. Communities repeatedly navigated emotional extremes—euphoric celebration following successful airdrops (the free distribution of tokens to users), communal despair over failed investments, and intense anticipation during project launches or NFT minting events (the creation and registration of unique digital assets on the blockchain). In one project, the announcement of a snapshot triggered waves of speculation and emotionally charged reactions. Expressions of triumph mingled with collective disappointment. Such moments illustrate how affective states are not spontaneous reactions but ritualized outcomes shaped by temporal orchestration, infrastructural affordances, and collective anticipation.

Collins's (2004) concept of interaction ritual chains is instructive here, highlighting how emotional energy is collectively generated and sustained through ritual participation. In Web3, such affective rituals are mediated by technological interfaces—project dashboards, countdown clocks, visual progress bars—and economic mechanisms like staking rewards, token distributions, and airdrops. These infrastructures do more than enable participation; they actively cultivate emotional cycles, embedding anticipation, anxiety, and hope into participants' everyday digital practices.

This cultivation of emotional energy can undergo a violent inversion when the rules of reward are abruptly reconfigured. In one lending-protocol testnet, after months of ritualized daily engagement—swapping test tokens, delegating to

validators, and claiming simulated interest—the community’s anticipation reached its peak at the airdrop checker’s release. The interface, which we had loaded with hope, now delivered a gutting formula: our “level,” a badge of honor earned through countless tasks, now dictated a mandatory monetary stake to claim rewards. In the main Discord, a performative calm was enforced; critical questions were deleted and dissenting voices, including my own, were swiftly banned. This silencing ritual fractured the community. In private Telegram channels and on X, the collective hope we had nurtured for months shattered into a shared lexicon of outrage. The affective arc—from collective anticipation to fractured outrage—demonstrated how platforms actively mediate emotional energy, converting the participatory rituals of hope into the segregating rituals of exclusion and forging negative affective capital that long outlives the immediate crisis.

Such crises render the politics of code legible: scripts that once conferred eligibility now enact expulsion, translating entitlement into injury. The rupture is liminal (Turner 1977): participants suspended between having belonged and being denied, often coalescing into counter-publics of “we, the wronged.” From these intervals circulates negative affective capital—warning, caution, cold anger—that travels into subsequent cycles, disciplining participation and sharpening boundary work.

The emotional economy of hope and betrayal is perhaps most vividly experienced during high-stakes minting events. Participants often prepared meticulously—setting alarms, preloading wallets with the necessary gas fee, and engaging in symbolic rituals of good fortune (“Good vibes for y’all 🙏”). Yet technical failures, high gas fees, or rapid sell-outs frequently transformed anticipation into frustration, disillusionment, or accusations of manipulation. Discord chats echoed with emotional intensity: “Completely devastated,” “Worked months and got nothing,” or “Devs manipulated the drop!”

This affective volatility parallels traditional religious experiences, where ritual participation evokes states of ecstatic joy, collective vulnerability, and existential anxiety. However, unlike traditional rituals anchored in theological narratives, Web3 rituals offer no transcendental guarantees. Economic incentives and algorithmic contingencies structure emotional investment, embedding uncertainty directly into the ritual fabric. Turner’s (1977) notion of liminality is again relevant—airdrop moments, project launches, and token unlocks suspend participants in states of ambiguity and heightened emotional charge, fostering communal experiences of shared uncertainty, anticipation, and disappointment.

Affect in Web3 is also distinctly economic. Tokens, NFTs, and staking rewards serve both as symbolic artifacts and financial instruments, binding emotional and economic value into a single ritual system. Participants do not merely hope abstractly—they project financial potential into emotional engagements, measured in token prices, staking yields, and NFT valuations. This affective-economic nexus transforms ritual participation into emotionally

charged economic performance. Across diverse communities, slogans like “HODL, price will pump! 🚀” reinforce the fusion of belief and speculation, reflecting how economic conviction becomes a mode of emotional attachment.

Furthermore, decentralized affective economies are mediated by nonhuman actants—bots, smart contracts, wallets, and algorithms. Latour’s (2005) ANT clarifies how these technological agents coproduce affective states. Smart contracts distribute tokens, wallet interfaces display balances, bots announce events—each shaping emotional rhythms. My own participation revealed how algorithmic unpredictability—snapshot timing, fluctuating gas prices—transformed routine actions into emotionally charged rituals of suspense and collective anticipation.

In Web3, affect is endogenous to valuation, not an epiphenomenal residue. Design choices that distribute eligibility and pace anticipation (threshold scripts, allocation formulas, countdown mechanics) convert directly into pricing and liquidity conditions at launch: transparent or generous allocations tend to generate affirmative word-of-mouth, thicker demand, and reputational lift; opaque or retroactive gates catalyze grievance that depresses enthusiasm and shadows reputation. Put differently, affective capital and economic capital are convertible currencies: pride in OG status buys early access; outrage at “not eligible” converts into reputational drag and sell pressure; post-crisis residues travel as negative affective capital that disciplines future participation. To analyze belonging in decentralized systems is therefore to analyze how infrastructures simultaneously script attachment and price discovery—the ritual economy and the token economy are coproduced.

In sum, affect in Web3 is ritualized and infrastructured—through affordances that pace attention, scripts that gate eligibility, and economic mechanisms that reward or deny—such that emotions adhere to signs (Ahmed 2004) and circulate through interaction ritual chains (Collins 2004) with material consequence. As these circuits move across dashboards, drops, and governance events, affective capital proves convertible—into access, price dynamics, reputational lift or drag—embedding symbolic intensities directly within technical and economic practice.

Reflexivity: The Researcher as Pilgrim

Reflexivity, far from being merely methodological self-awareness, emerged as a central ritual stance throughout my ethnographic journey into Web3. My positionality shifted continuously between observer, participant, and, at times, accomplice in the very phenomena I sought to understand. Navigating decentralized communities, staking tokens, minting NFTs, running nodes (network participants that validate and store blockchain data), and engaging deeply in community rituals transformed my role from a detached ethnographer into an emotionally invested pilgrim traversing the symbolic and economic landscapes of Web3.

This reflexive stance aligns with Donna Haraway's (1988) concept of situated knowledge—the idea that all knowledge emerges from specific embodied locations and partial perspectives. My situatedness was shaped by constant engagement in decentralized practices: managing multiple participation roles across wallets, participating in airdrops, navigating token-staking cycles, and contributing to Discord communities.

The pilgrimage metaphor captures this reflexive experience effectively—a journey through anticipation, anxiety, euphoria, and disillusionment. Moments of communal celebration—such as successful airdrops or the acquisition of high-status NFTs—evoked sensations of arrival and symbolic fulfillment. Conversely, episodes of exclusion or economic betrayal prompted ethical reflection on my complicity within these economies. Was I merely observing, or also reinforcing the very structures I sought to analyze?

My participation in the Mint Blockchain community exemplifies this complexity. Engaging daily in the virtual tree-watering ritual—designed to reward streaks of consistent engagement—I confronted tensions between symbolic commitment and instrumental action. Ethical boundaries blurred around behaviors such as “stealing water,” with my own choices fluctuating day to day. Fieldnotes captured these ambiguities: “Today I deliberately chose not to steal—felt morally uneasy . . . yesterday I did it without hesitation.” Such moments crystallized the fluidity of ethical reasoning under ritual pressure.

Managing multiple accounts in other communities introduced further layers of reflexivity. Each persona enacted distinct strategies and navigated moral boundaries differently. This fragmentation raised persistent questions: How did these selves influence my research integrity? Was I a participant, a strategist, or both? Fieldnotes voiced this ambivalence: “Running multiple accounts today felt ethically ambiguous—effective economically, yet problematic morally. Am I researcher, speculator, or both simultaneously?”

Turner's (1977) notion of pilgrimage as a liminal journey further clarifies this experience. Decentralized spaces constantly positioned me between participant and observer, sincerity and strategy, economic interest and symbolic devotion. These thresholds intensified reflexivity, compelling ongoing self-examination regarding motivations, roles, and responsibilities. At times, this reflexivity crystallized in my own internal questioning: “Am I really here for the community or just the gains? Sometimes even I don't know.”

Reflexivity also carried methodological implications. My embedded presence inevitably influenced community dynamics and ritual outcomes. By advising new members, sharing tactics, and participating in debates, I became not just an observer but a ritual facilitator. This complicity was ethically significant. Haraway's concept of situated knowledge requires acknowledging how embodied presence co-constitutes the field itself. Rather than seeing reflexivity as a limitation, I embraced it as an epistemic commitment—one that recognizes knowledge as emerging through entangled relations between researcher and researched.

In conclusion, reflexivity in Web3 ethnography demands recognizing the researcher as a pilgrim: navigating symbolic terrains, negotiating ethical boundaries, and engaging emotionally, economically, and ritually. My journey demonstrates that ethnographic knowledge arises not from distance but from immersion—marked by liminality, complicity, and situatedness. Far from compromising validity, such reflexivity deepens ethnographic insight into how decentralized rituals are lived, enacted, and coproduced.

Integrative Note on Theory and Data

This article proposes the DRA framework not as a detached theoretical abstraction but as a direct outcome of sustained ethnographic immersion in decentralized Web3 communities. At its core, DRA synthesizes three complementary theoretical lenses—lived religion, ritualization, and ANT—into an integrative analytical framework uniquely suited to unpack the symbolic complexity and emergent ritual forms of decentralized environments. Traditional approaches have proven inadequate for addressing the complex interplay of human, technological, symbolic, and economic dimensions in these environments.

To clarify the practical power of DRA, let me return briefly to the empirical example of the Mint Blockchain project. As detailed, this decentralized community, organized around daily digital actions—such as watering a symbolic digital tree, engaging in leaderboard competitions, and completing periodic tasks—offers an exemplary case for demonstrating how DRA's theoretical components converge in practice. Far from a niche case, Mint Blockchain provides a model of how mundane actions in Web3 can evolve into ritualized performances infused with moral intensity, symbolic meaning, and collective emotional investment.

From the perspective of lived religion (Ammerman 2014; McGuire 2008), participants in Mint Blockchain did not enact ritual competence through adherence to formal doctrines but through repeated embodied practices—daily watering rituals, maintaining participation streaks, and making ethical decisions about symbolic behaviors like “stealing water.” These embodied engagements reflect the lived negotiation of meaning and sacrality.

Ritualization theory (Bell 2009) adds further analytical precision, emphasizing how practices are differentiated from ordinary actions through repetition, framing, and boundary-making. In Mint Blockchain, these processes materialized through orchestrated daily cycles, symbolic progressions (e.g., the growing digital tree), and task-based hierarchies that inscribed sacredness into the infrastructure of participation.

ANT (Latour 2005) deepens the analysis by foregrounding the agency of nonhuman actants. Smart contracts enforce participation rules, Discord bots assign roles, and wallets embody user progression, making interactions symbolically legible. These technological entities do not merely support ritual performance—they coproduce it. ANT thus reveals how decentralized rituals are enacted through dynamic interactions between human and nonhuman actors.

The strength of DRA lies in its integrative capacity. Neither lived religion, ritualization theory, nor ANT alone can account for the layered complexity of ritual life in decentralized systems. Together, however, they provide a comprehensive analytical apparatus capable of interpreting the ethical, symbolic, and infrastructural dimensions of Web3 participation.

More than a synthesis, DRA represents a theoretical innovation. It challenges inherited divisions between technology and spirituality, individual experience and collective ritual, symbolic meaning and economic logic. Instead, it highlights how decentralized infrastructures generate ritual formations that are simultaneously technical, affective, symbolic, and sacred.

Looking forward, DRA offers a robust analytical framework for future comparative research—across decentralized systems, platform-mediated communities, and institutional religious contexts—as faith communities increasingly engage Web3 infrastructures. The emergent paradigm of “distributed digital religion,” which I develop further in a forthcoming monograph, signals a promising trajectory for digital religion studies. It invites new inquiries into how sacrality, ritual authority, and collective imagination are reconfigured within algorithmically mediated systems.

In sum, DRA—empirically grounded, theoretically integrative, and analytically robust—provides a necessary intervention in the evolving field of digital religion. By bringing together lived experience, ritual differentiation, and technological agency, it clarifies how decentralized rituals emerge and why their study demands conceptual tools attuned to the realities of distributed environments.

Conclusion

This article has established Web3 as an emergent field of digital religion—a novel terrain where decentralized infrastructures, comprising smart contracts, token economies, blockchain algorithms, and symbolic interactions, generate unprecedented forms of ritual life. Far from occupying the margins, these rituals serve as vital mechanisms by which decentralized communities shape identity, cultivate social cohesion, construct symbolic hierarchies, orchestrate affective economies, and co-create collective meaning.

Understanding the ritual dynamics of Web3 thus demands analytical frameworks able to grapple simultaneously with technological, economic, symbolic, and affective complexities. Traditional approaches—whether overly institutional or narrowly subjectivist—have proven insufficient for capturing the multilayered character of these phenomena. In response, this article has articulated DRA: a rigorous yet flexible framework purpose-built to illuminate the intricate workings of decentralized rituals.

DRA embodies a deliberate synthesis of three complementary theoretical lineages: lived religion, ritualization, and ANT. The lived religion perspective foregrounds participants’ embodied and ethical engagements, ritualization theory elucidates the strategic construction of symbolic boundaries through

repeated actions, and ANT clarifies the mediating and coproductive roles of technological actants. Together, these approaches offer an integrative lens for understanding how rituals emerge at the intersections of technology, symbolism, economic logic, and collective affect.

The analysis presented here demonstrates that Web3 rituals are distinguished from their traditional counterparts by several defining features: the algorithmic mediation of sacred temporality, the formation of digital interfaces as ritual habitats, the multiplicity and fragmentation of agency, the constitution of symbolic hierarchies, and the orchestration of affective economies marked by hope and betrayal. My reflexive position as an engaged participant-observer has further underscored how researchers are inevitably implicated in—and co-constitutive of—these ritual dynamics, thus highlighting the necessity of reflexive ethnography for the study of emergent ritual fields.

Beyond synthesizing these insights, DRA marks a conceptual intervention in digital religion studies. It challenges the habitual separations of technology and spirituality, individual and collective ritual, and economic motivation and symbolic meaning. Instead, DRA reveals how decentralized infrastructures braid these elements into hybrid ritual formations: technical, symbolic, economic, and sacred at once.

The theoretical architecture of DRA invites broad comparative application. While this article has focused on emergent Web3 communities, its analytical principles are robust enough to guide future research across digital, hybrid, and even traditional ritual contexts. Researchers may deploy DRA to trace how established religious traditions adapt within decentralized infrastructures or to interrogate how other technologically mediated collectives negotiate sacredness, authority, and communal identity in digital environments.

Ultimately, this article positions DRA not as a terminus but as a conceptual threshold—an invitation to further exploration. The rapidly evolving landscape of decentralized digital technologies demands perpetual theoretical refinement and empirical engagement. The emerging paradigm of distributed digital religion, which I will elaborate in my forthcoming monograph, signals a new trajectory for comparative inquiry in the study of religion and ritual. By tracing how decentralized infrastructures continually refigure rituals, sacredness, and collective meaning-making, future scholarship will be better equipped to grasp—and articulate—the profound transformations unfolding within contemporary religious life.

In sum, DRA provides a critical conceptual toolset for the field of digital religion. It addresses a significant theoretical gap while opening new horizons for comparative inquiry. Far from disappearing, ritual life in the age of decentralization is being reconstituted—reconfigured, reenchanting, and redistributed within the vibrant nexus of technology, symbolic imagination, and economic incentive.

Competing interests

The author declares that they have no competing interests.

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A Neurophenomenological Perspective on the Self and Spirituality: The Role of the Affective Core Self

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The self is central to spirituality because the self is necessary for consciousness, and spiritual relations are fundamentally about the self. Diverse research illustrates the role of the downregulation of the right parietal lobe (rPL) in the spontaneous manifestation of spiritual experiences and during meditative practices. The functions of the rPL are central to the self, especially the embodied self. Disturbances of the rPL and embodied self-functions are associated with spiritual experience, exemplified in their association with "selflessness." Many forms of self appear incompatible with spiritual and mystical experiences. An exception is the affective core self, the most ancient form of the self. Manifestations of the affective core self correspond directly to many characteristics of mystical experiences, illustrating its relevance for explaining the neurophenomenology of spiritual experience. The central functions of the affective core self and right-hemisphere processes in core features of spiritual experiences illustrate a reversion to earlier forms of self-representation and explain the neurophenomenology of some spiritual experiences.



Introduction

There are several challenges in examining the relationship between the self and spirituality. Two of the most complex involve just which one of the many forms or types of the “self” is related to spirituality and what form of spirituality is being considered. Spirituality, like religion, encompasses a wide range of human behavior and cognition, ranging from habitual, mundane daily observances and specific metaphysical beliefs to rare ecstatic rituals and experiences of otherworldly encounters.

Traditions in anthropology and religious studies have characterized religious experiences as either cultural or individual, a result of attributing the meaning of a “religious experience” to a particular event. This notion of attributing meaning is apparent in the examination of the related concept of the “sacred” in cross-cultural contexts. Anthropologists have noted that virtually anything can be considered sacred—even a rock, a vegetable, an insect, or an animal—and that it is society (culture) that makes judgments regarding what is sacred and encodes those determinations. This is an extreme of cultural relativism, the notion that religion, spirituality, and the sacred are merely arbitrary cultural traditions.

In direct contradiction to this relativist posture, cross-cultural patterns of spirituality and the relationship of spiritual experiences to neurological functions illustrate that these spiritual dimensions are not just arbitrary cultural variables but often reflect common patterns and similarities across cultures that indicate that their source is not in arbitrary cultural beliefs. The relationship of the self and spiritual experiences to specific brain regions, and in particular the downregulation of the default mode network (DMN) and right hemisphere parietal lobe, illustrates a biological correlate of spirituality. The cross-cultural view of selflessness as a path to spiritual experiences illustrates these neurobiological correlates, reflecting intrinsic functions of our evolved psychology that facilitate spiritual experiences.

With the many forms of self and spirituality, we need a framework for addressing how the self is related to spirituality by linking both to biological processes. This framework could be used as a tool to sort through the diverse cultural conceptions of transcendent experiences (e.g., bliss, love, awe, void, non-duality) to find biological structures underlying their pervasiveness. The evidence presented here employs such a neurophenomenological framework, linking the functions and effects of the brain’s circuitry to the qualities of the experiences.

While both the “self” and experiences of “spiritual transcendence” are associated with specific neurological regions, it is not the specific nodes or regions but rather the global outcome of the neuropsychological processes the regions engage that produce spiritual experiences. Despite a long history of considering the self as a specific entity, contemporary thinking in the neurosciences characterizes the self as a perception that results from interactive processes within circuits and across regions rather than because of the

functions of a specific neurological site. Rather than a single neural entity, the self appears to be based on experiences associated with integrated functions that link diverse neurological processes. This view of the self as an experience produced by integrated neurological processes allows for an understanding of the relationship between the brain and the self, as well as spiritual experiences, as involving both the activation and suspension of specific brain processes that normally produce the sense of self and our interactions with the world.

The evidence presented here suggests that spiritual experiences are facilitated by a reduction in right hemisphere parietal lobe activity and the activation of neural circuitry related to the affective core self (ACS). The ACS is a concept describing the ancient, foundational, emotionally driven part of a person's being, rooted in mammalian subcortical brain structures. It is considered a primary filter for interpreting the world, influencing feelings, and providing a sense of continuity across the lifespan. We show that the right hemisphere primarily mediates ACS information to the cortex, with both the ACS and right hemisphere making neurophysiological contributions to spiritual experiences. However, it is first important to consider the phenomenological relationship between the self and spiritual experiences.

William James's Concepts of the Self and Spirituality

William James's perspectives, reviewed here, illustrate the complexity of the issues confronting us in determining just what is the self and how spiritual experiences are in some sense beyond the self. James (1902) proposes two principal parts to the Self, the "Me," the Empirical Self, versus the "I" or "Pure Ego," with the "Me" having a spiritual aspect. The "Me," the objective, known self, comprises Material, Social, and Spiritual selves, the latter being an enduring and intimate inner subjective self that encompasses one's ideals, beliefs, conscience, and values. This Spiritual self is to James the principal source of one's spiritual nature and spiritual qualities, as well as the core of personality and essential being. James considers this Spiritual Self to be a higher form of the self, prefiguring transpersonal concepts of post-egoic forms of self.

James (1902) also refers to a "subliminal self" in the context of his psychical research on mediumship, an unconscious psychological domain of the mind operating below conscious awareness that serves as the basis for paranormal abilities and cosmic consciousness. The subliminal self operates in mediumistic spirit communication, providing intuitive information beyond conscious awareness; it is also capable of higher cognitive processes, expressed through insights, inspirations, and creative problem-solving. The subliminal self is a separate "fragmentary secondary personality" capable of acting independently with its own center of will and intention, even influencing the primary self and consciousness by appearing as a spiritual source of knowledge. "Yet some life-changing moments seem to come wholly from another source, appearing

as mental states or altered states of consciousness from either deep within a person's mind or, perhaps, a source beyond the self" (Yaden and Newberg 2022, 3). It appears that James's famous quote about a special form of consciousness separated from waking consciousness involves not the Spiritual Self but rather the subliminal self, which is the source of visionary experiences.

David Yaden and Andrew Newberg (2022, 3) present James's broader views of the self and its relationship to spirituality, noting that what constitutes a spiritual experience is nebulous, overlapping with religious, mystical, peak, and self-transcendent experiences. Nonetheless, the idea that these have a relationship to the self is a recurring theme, and the self is a key element in James's considerations of religion, serving as the connection between the person and the divine. A recurring notion is that spiritual experiences are referenced to the self, and also beyond the self, yet are part of the self, as in James's concept of a subliminal self, which posits a spiritual presence as part of humans.

As Yaden and Newberg (2022, 136) note in their review of measures of spiritual wellbeing, an explicit reference to the self is present but so is the importance of "something beyond one's self." This notion of the spiritual as being beyond the self is central to meditation practices, which produce a reduction of oneself and decentering from it. While some sense of self may temporarily diminish or even disappear during meditation and spiritual experiences, the specific aspect of self that undergoes this reduction is unclear. Furthermore, there appear to be fundamentally different forms of self-loss. Some accounts identify a loss of agency and self-control, while others refer to a loss of bodily boundaries. An experience of losing self-boundaries that leads to an experience of oceanic merging is clearly distinct from the self-loss encountered in out-of-body experiences, often reported as seeing one's spiritual body from an external perspective. Autobiographical aspects of life history and identity disappear in some spiritual experiences, while others engage with a life narrative and its transformation. Yet across most, if not all, spiritual accounts, it appears that a sense of self is still present that receives or participates in the experience, something that has the spiritual experience when the normal self is absent. Some form of the self seems to be a necessary reference point. Even when one loses all sense of self during spiritual experiences, afterwards, there is the tendency to describe it as if something happened to some aspect of the person. Of course, it is difficult to know what such a description implies about the remaining sense of personal identity that persists even in cases of a complete merging with the environment, cosmos, or God. But even if it seems that the self goes away completely, there is someone, some aspect of the perceiving person, who has the experience. One could propose that this experience during a spiritual experience is the spiritual self. This article explores what the biological bases of that spiritual self might be and how its biological functions and characteristics relate to spiritual experiences.

Why Should the Self Be Key to Spiritual Experiences?

This section frames spiritual experience in reference to the self, showing that self-related processes are fundamental to both consciousness and spirituality. A review of neuropsychological research is used to show that spiritual transcendence emerges from self-attenuation—what Brik Johnstone and Daniel Cohen (2019) call selflessness.

The role of the self in spiritual experiences parallels the essential role of the self in consciousness. Consciousness is typically for something, and that is the self as the focus of awareness and the system of auto-reference. By analogy, the experience of the spiritual is typically for something, and that is the self, which serves as the basis for our understanding of the world, including its spiritual dimensions.

If we conceptualize the spiritual in terms of a spiritual entity, the role of the self is also central. A spirit is a social entity conceptualized with characteristics very similar to those of a human's, with spirits possessing many human qualities. The relationship of spirits to humans, particularly in the form of gods, exemplifies a broad set of social concerns. Understandings of concepts of spiritual entities from the perspective of the evolved psychology and cognitive science of religion see spirits as reflecting functions of innate operating systems that evolved to manage social relations. Spirits reflect our highly developed self-capacities for relating to social others—recognizing social others, inferring their intentions (“mind reading”), and internalizing their expectations into our own qualities, values, and behaviors. Self-capacities are necessary for perceiving others, spiritual entities, and their qualities, which centrally reflect the capacities of the self (i.e., intentions, agency, desires, emotions, morals, goals, communication, etc.). The most significant differences between the self and spirits involve the spirits' lack of physical bodies, instead being nonphysical agents, and the general presumption that spirits have capacities beyond those of humans (i.e., access to knowledge beyond normal human capabilities).

Selflessness and Spiritual Experiences

Johnstone and Cohen propose that it is not just the self but rather a broader condition of the self called selflessness that underlies experiences of spiritual transcendence. The significance of selflessness for spiritual experiences is attested to in religious traditions worldwide, which, despite diverse conceptual frameworks, generally contend that the loss of some sense of oneself is a key factor in attaining access to spiritual and other transcendent experiences. This self-loss is illustrated in various of Newberg's publications, which report a decrease in activity in the parietal lobe during spiritual experiences of different traditions, for example meditation for Buddhists and prayers for Franciscan nuns. Both groups reported strong spiritual experiences that included a sense

of loss of the self, although they expressed this in distinctive terms reflecting the beliefs of their specific religious tradition.

Johnstone and Cohen (2019) review evidence suggesting that religious practices attenuate the right parietal lobe (rPL), resulting in a reduction in certain aspects of self-functioning and an attenuation of the self, which enhances the experience of spiritual connection. Johnstone and Cohen review neurological findings that show that such experiences of a diminution of one's sense of self involve changes in the rPL and its management of self-related information. Johnstone and Cohen find that reductions in rPL are associated with reductions in one's sense of self and an enhanced potential for spiritual transcendence. They summarize their model of selflessness and spiritual transcendence as beginning with a sense of self derived from neuropsychological integration produced through rPL functions. Spiritual experiences occur more frequently with a minimization of this sense of self, which can be compromised by injury, disease, or certain behavioral practices (e.g., meditation). This heightened selflessness leads to experiences that are understood as spiritual encounters or transcendence.

Johnstone and Cohen (2019, 101) conclude that “selflessness operates as a universal neuropsychological foundation for spiritual transcendence across multiple cultures, ethnicities, and faith traditions, even if such experiences are interpreted differently depending on religious context.” “[D]iminishing of the sense of the self experienced during spiritual transcendence is one neurophysiological/neuropsychological link that explains the similarity of such experiences across different faith traditions” (Johnstone and Cohen 2019, 29). This link between selflessness and spiritual experience suggests that it is the suspension of self-processes that enables access to spiritual experiences rather than the self-processes producing the spiritual experience. This is attested to by studies reviewed later that report increases in spiritual experiences and greater engagement with spiritual practices among individuals with right-hemisphere disorders, resulting in a reduction of right-hemisphere neurophysiological functions that cause a decrease in one's sense of self and increases in selflessness.

Neuropsychology of the Self and Spiritual Experiences

Here we review evidence for the central role of the rPL in integrating self-referential information and how attenuation of these processes facilitates the emergence of spiritual experiences. This loss of parietal inhibition enhances limbic and DMN activity, contributing to core phenomenological features of spiritual and mystical experiences. Research indicates that spiritual experiences depend on suspending ordinary forms of the self, illustrating how spiritual states arise from the attenuation of habitual self-processes.

Johnstone and Cohen (2019) propose that neuropsychological processes based in the right hemisphere provide the integration of diverse sensations and information used to create the sense of a unified experience of self, and that the suspension of such self-processes of the rPL facilitate spiritual experiences. The parietal lobe is a highly connected hub that manages attention, engages in sensory information processing, produces spatial awareness, and engages memory recall, providing key information for the self. Johnstone and Cohen (2019) review evidence of the roles of the right hemisphere, particularly the rPL, in processing diverse forms of self-related information, such as self-awareness, visuospatial and body integration, episodic memory, and other functions essential for the processes that produce the self. The central importance of right-hemisphere functions for self-processes is illustrated by the extensive research establishing the predominant role of the right hemisphere (versus the left) in self-related emotional processing (LaVarco et al. 2022) and self-facial recognition (Keenan, O'Connor, and Pascual-Leone 2001). Self-recognition is a fundamental form of awareness and consciousness, and a template for recognizing the “other.” The right inferior parietal lobe (rIPL) has a central role in processing self-referential information for representation of the physical self through the integration of sensory data with memory and mental processing (Feinberg 2013). Together with the prefrontal cortex, the rIPL connects regions that are crucial for making self/other distinctions and generating subjective self-experiences (Lou et al. 2004).

The Parietal Lobe and the Embodied Self

The embodied self is a basic aspect of the multifaceted self, deeply embedded in biological processes (see Tsakiris and De Preester 2018). The parietal lobe plays a crucial role in the embodied self, as its neural networks connect it with the premotor cortex (PMC) and motor cortex. The embodied self derives from neural operations that integrate interoceptive and exteroceptive impulses, which provide a basis for feelings of having a body (Qin, Wang, and Northoff 2020). The embodied self emerges from the integration of interoceptive processes that have their core hub in the insula and connections with the thalamus. These transmit information from subcortical areas to integrate external environment information and exteroceptive self processes involving insula functions, the anterior medial prefrontal cortex, temporal–parietal junction, and the PMC (Qin et al. 2020).

Parietal lobe functions are fundamental to establishing interoceptive–exteroceptive relations and body awareness, which are crucial for creating and maintaining the spatial representation between the body and the environment that defines the limits of the physical (embodied) self. The parietal–premotor loop functions produce bodily and spatial awareness, spatial self-location, agency,

and the sense of presence that constitutes the embodied self. The interactions between the parietal lobe and PMC link perception and action, forming the basis of the embodied self through one's goal-directed movements, which integrate intention and agency into bodily actions. These connections produce a sense of body ownership and agency, expressed through the actions one intends, which provide the core of the embodied self and its nonverbal sense of self-presence. The PMC supports self-agency and produces a socially embodied self through the actions of the body schema and the activation of mirror neurons. The PMC (and inferior parietal lobule) contains mirror neurons that contribute to forms of social Selfhood, including empathy, mind reading of intentions, and embodied simulation, which produce understandings of social actors and social situations.

The Roles of the Right Parietal Cortex in the Neurology of Spiritual Experiences

Johnstone and Cohen (2019) review studies that indicate some spiritual experiences are more prevalent in people with reduced activity in the rPL. Activity in areas of the right hemisphere is crucial to certain forms of self-related experience, including spiritual experiences (Newberg and Iversen 2003). The role of the suspension of the right hemisphere in spiritual experiences is illustrated in Johnstone and Cohen's (2019) review of neuroimaging studies, which show that an overall reduction of right parietal cortex activity is associated with increases in spiritual experiences. Roles of the right hemisphere parietal lobe in normal self-functions are illustrated in research on clinical disorders of the self, which indicates that these patients often exhibit extensive damage to the right hemisphere; there are also reports of significantly more spiritual experiences in people who have suffered right-hemisphere brain injury or disease, specifically in the parietal lobe.

Why does reduced neurological functioning in the rPL lead to increased spiritual experiences? Johnstone and Cohen propose that integrated neuropsychological processes involving the rPL, which create a sense of self, are also the foundation for spiritual experiences of transcendence (2019, 15). This is consistent with Eugene d'Aquili and Andrew Newberg (1993) who argue that a reduction in rPL function is a crucial mediator of spiritual experiences. But it turns out that the effect is more nuanced, that it is the loss of rPL self and inhibitory functions that elicit spiritual experiences. This perspective proposes that the spiritual experience is something that emerges when specific right-hemisphere functions, which normally mediate self-experience, are held in abeyance, allowing for more primordial forms of auto-reference to emerge. These and other findings suggest that the emergence of spiritual experiences is associated with the suspension of specific brain functions.

Right Parietal Lobe Inhibition and Inhibition Loss in Spiritual Experiences

The roles of the parietal lobe functions in producing the bodily self and the sense of physical presence illustrate how its dysfunction changes central mechanisms of self-referential processing that are relevant for the psychological processes of spiritual experience. The loss of spatial orientation functions in the parietal lobe is associated with the emergence of intense spiritual experiences, interpreted as involving a loss of one's sense of a separate self, which results in a powerful experience of connections with others, the cosmos, and even God. The compromise of the parietal lobe's boundary-defining functions undermines the experience of separateness and allows a sense of merger of the self with the environment (d'Aquili and Newberg 1999). The loss of parietal-premotor connectivity and the contributions from the PMC during spiritual experiences may reflect the dramatic changes in one's sense of agency from the inability to implement one's intentions. The PMC functions of forming motor intentions and initiating action are suspended in some mystical states with a sense of reduced agency, characterized by a loss of volitional control, resulting in states of passivity and surrender where one feels influenced by spiritual forces. The downregulation of the rPL leads to the loss of its habitual functions in forming a sense of the physical self and body separate from the environment. The loss of the embodied self leads to a dissolution of the sense of "body-as-agent" and feelings of having boundaries between the self and the world. Of particular importance may be the loss of function of the right angular gyrus in the parietal lobe, which plays a crucial role in distinguishing the self from others and the environment. The reduction in its functions contributes to the sense of unity with spiritual entities that typically accompanies spiritual experiences. Compromising the functions of the temporo-parietal junction, which has a critical role in the formation of the embodied self, would undermine a sense of the body separate from the environment. A frequent aspect of spiritual experiences involving a reduction in the sense of a separate self appears to reflect the abatement of rPL processes that normally sustain aspects of the self.

The notable ineffability and inability to express mystical experiences may also be directly related to the downregulation of the rPL. The rPL connections with the motor and speech production areas (including those in the left hemisphere) are a major connectivity relationship in the brain. Speech production and articulation require several levels of motor planning, including the supplementary motor area (SMA) for speech; the PMC for performing the articulatory movements; and the primary motor cortex for control of the muscle actions of the tongue, jaw, and lips and coordination of their actions with the larynx and diaphragm. Loss of parietal connectivity with these regions would impede the ability to formulate and express ideas about the experience.

The role of rPL inhibition in spiritual experiences reflects the functions it, and especially several of its key components, has as significant regulatory hubs that exercise top-down modulation. In addition to the rIPL, several nodes in the right parietal cortex usually exercise inhibitory influences on DMN (Corbetta, Patel, and Shulman 2008; Leech and Sharp 2013), including the temporoparietal junction (TPJ), which has functions of perspective-taking, theory of mind, and agency, and the posterior parietal cortex, which engages spatial attention and sensorimotor integration. These regulatory functions exert inhibitory control over left-hemisphere regions, including the left frontal language network and verbal processing, as well as the left-hemisphere DMN, limbic areas, sensorimotor cortex, and the visual-spatial network. The loss of regulatory control by the rPL over limbic regions results in the loss of inhibition of this latter region. The loss of rPL inhibition is associated with a range of altered states of consciousness (ASC; such as meditation and spiritual/mystical experiences, psychedelics) as well as specific psychiatric and neurological conditions, including ego dissolution and depersonalization. This disinhibition is expressed in increased limbic salience, characterized by heightened emotional intensity and enhanced meaning-making. A specific effect of the loss of parietal inhibition is the increase in activity in the posterior cingulate cortex and its functions involving self-referential cognition (Leech and Sharp 2013). Reduced inhibition of the amygdala and hippocampus enhances their functions of attributing salience, making ordinary events feel highly significant.

Research suggests that diminished activity in the rPL results in increased connectivity and activity in the DMN and limbic lobe (see Newberg, d'Aquili, and Rause 2001a). The loss of parietal inhibition over the DMN releases its functions, shifting attention inward with increases in introspection and contemplative absorption, enhanced internal imagery, intensified emotional salience and response, and expanded self-reflection in autobiographical memory and narrative thought.

Due to its essential role in spatial body representation, the loss of rPL connectivity leads to alterations in the sense of self-location. The combined effects of loss of parietal functions and enhanced DMN and limbic functions produce the core of what Newberg and colleagues have found in diverse mystical, meditative, and spiritual experiences, such as dissolution of a self-world boundary, with a decreased sense of being a “localized” self that leads to experiences of oneness, wholeness, unity, and transcendence. The loss of normal rPL inhibition has the effect of increasing activity in the DMN and limbic lobe, which is directly related to the experiential effects associated with a variety of ASC. These experiential effects include enhanced imagery and affective memory, vivid self-experience with altered self-location, self-boundary dissolution and unity experiences, intensified emotions, and increased

introspection with heightened significance. Loss of rPL inhibition in the right-hemisphere DMN and limbic structures causes increased limbic intensity, resulting in heightened emotionality, emotional salience, and internal narrative self-talk, as well as increased meaningfulness.

Spiritual Experiences and States of the Self in the DMN

The diminution of ordinary self-functions to access spiritual experiences was originally proposed by d'Aquili and Newberg (1999) and illustrated more recently in a study (Fingelkurts, Fingelkurts, and Kallio-Tamminen 2021) that analyzed brain scans and verbal reports of spontaneous intrusions that occurred during meditative practices. These intrusions, as described in subsequent self-reports, had recurrent features that identify the basis of these experiences in relation to customary distinctions among self-types. Correspondences between the neurophysiological profiles manifested in operational synchrony analyses of EEG and the profiles revealed in self-reports identified three specific self-referential networks of the DMN. These self-referential networks are the intrusions into meditation, self-functions that are normally suspended during it, spontaneous manifestations that reflect intrinsic forms of the self. Based on these patterns, Fingelkurts, Fingelkurts, and Kallio-Tamminen (2021) propose three distinctive forms of experiential Selfhood, which they refer to as the I, Self, and Me. The following neurophenomenological descriptions are based on common patterns in self-reports and EEG reports (summarized from Winkelman 2024):

“Me”—Embodiment—representational-emotional agency. “Me” is also referred to as “minimal self,” “proto-self,” and “bodily self.” “Me” involves right posterior DMN, right temporal, parietal, and occipital lobes, which are the location of the mechanisms for interoceptive and exteroceptive sensory processing and emotional states and memories. The suspension of “Me” in meditation produces a loss of bodily perceptions, illustrating representation of the embodied self.

“T”—Reflection/narration—reflective agency. The “T” is involved in thinking about oneself, self-reflection, and reinterpretation of memories involved in episodic and semantic memory events, involving autobiographical storytelling. The “T” is localized in the left posterior DMN, the left temporal, parietal, and occipital lobes.

“Self”—First-person agency. “Self” provides the phenomenal sense of agency and the “phenomenal non-conceptual core in the act of knowing itself” (Fingelkurts, et al., 4). The “Self” involves anterior DMN regions, the left and right frontal lobes, and the frontal midline area.

Notably, all these forms of self are incompatible with meditative experiences, emerging as distractions from the intended focus of meditative practices. Consequently, whatever constitutes a spiritual self involves experiences that emerge following the suspension of these DMN-mediated forms of Selfhood, functions that reflect the innate functional operation of brain modules. This natural basis of the I, Self, and Me suggests that there should be other innately organized self-referential brain circuitry that provides the functional qualities and operational mechanisms that produce the phenomenal qualities of spiritual experiences.

This research (Fingelkurts, Fingelkurts, and Kallio-Tamminen 2021) also strongly suggests that it is the suspension of a range of self-related functions (aspects of Selfhood) that is a necessary precondition for spiritual experiences, and conversely, that the elicitation or operation of specific self-aspects interferes with spiritual experiences. These findings support a model of spiritual transcendence involving the suspension of ordinary neurological processes that support the sense of self.

Across diverse conceptualizations of the divine, there is a commonality in that achieving spiritual transcendence requires, in some sense, a reduction of the self. Experiences of spiritual transcendence result from conditions that impair the sense of self, with spiritual experiences occurring because the self functions that maintain a sense of separateness from others are compromised (d'Aquili and Newberg 1999).

Can it be that there is no self to the spiritual experience, or do remaining aspects of the embodied or narrative self have the experience of the spiritual? Or is the self manifested in spiritual experience not yet identified? The suspension of these specific self-processes as a requisite for spiritual experiences raises the question of what it is that experiences spiritual reality. If well-known forms of the self—embodied, narrative, “I,” “Me,” and “Self”—are suspended, this suggests that some other form(s) of the self is operative in the absence of parietal- and DMN-based forms of self.

Affective Core Self

This section proposes that the self at the basis of spiritual experiences involves the ACS—an evolutionarily ancient, subcortical, pre-reflective form of consciousness. This biological basis for spiritual experience is illustrated with a neurophenomenological model that shows how downregulation of embodied and narrative self-systems permits intensified ACS-driven interoceptive and affective processes that generate the characteristic phenomenology of spiritual feelings such as unity, bliss, peace, and transcendence.

Research on the trans-species biological aspects of the ACS (see Panksepp and Northoff 2009; Panksepp 2011a, 2011b) and its functional characteristics

suggests a candidate for the spiritual self. This affective self provides a phenomenal and basic affective consciousness in relation to the environment. The ACS is a prelinguistic, preconceptual, and pre-reflective phenomenal consciousness that provides implicit and affective forms of self-related processing based in the subcortical midline structures (SCMS). The ACS is the evolutionarily oldest form of the self, manifesting even when other forms of the self are absent or in abeyance. The SCMS involves circuits found in reptiles and conserved in homologous forms in mammals and primates, serving as a basis for a “primary process” cognition shared by vertebrates (Panksepp 2011a). Humans and other animals share the SCMS, which provides the basis for the ACS, with functions to manage intrinsic affective states.

The principal brain structures of the ACS are located in medial (middle) brain regions and include notable DMN nodes such as the medial prefrontal cortex, anterior and posterior cingulate cortex, the cuneus and precuneus, as well as the brainstem, insula, hypothalamus, amygdala, hippocampus, and other limbic structures (Panksepp and Northoff 2009). These structures manage the evolutionary foundations of affectivity, mediating basic self-related processes (self-awareness, memory, affect), basic emotional responses, bodily sensations, motivation, autobiography, diverse social behaviors, and cognition.

The SCMS connections with the limbic brain regions that control homeostatic processes and visceral responses form the foundation of affective experience, manifesting in basic emotions and moods. Limbic regions provide meta-representations of sensory affects that differ from basic emotional affects due to the attribution of valuation through associative learning. These affective processes are expressed as social feelings in our relationships with the world and others, as well as in a myriad of influences on our varied senses of self, forming our basic traits and the patterns of our personality. These basic mammalian affective dynamics are central factors in consciousness and in producing the overall organization of the personality, providing the basis for all psychological functions (Alcaro, Carta, and Panksepp 2017). These ancient affective mechanisms provide the emotions and behaviors basic to our adaptations to environmental factors, influencing the habitual orientations of our moods and other affective habits.

The roles of the SCMS in emotional management may exceed the widely acclaimed capacities of the limbic system or emotional brain, organizing the basic affective neurodynamics and personality (Alcaro, Carta, and Panksepp 2017). These ancient brain regions manage instinctual and homeostatic processes, primary-process experiences, primordial emotions, and affective feelings (Alcaro, Carta, and Panksepp 2017, 9). The ACS reflects Carl Jung’s view of an instinctual affective form of Self consciousness based in affective relations with the material world.

The Affective Core Self as the Basis of Spiritual Experiences

Evidence that the ACS is the basis of many major features of spiritual and mystical experiences is based on the integration of inferences from many different sources. While there is no simple experiment to establish that the ACS is the basis of spiritual experience, evidence can be inferred from the homologies between basic ACS effects and the frequent characteristics of spiritual experiences. Further evidence would come from a neurological model of the mechanisms by which deliberate spiritual experiences (i.e., via meditation or similar practices) produce changes in the functions of ACS components, providing a paradigm for a neurophenomenological explanation of the brain mechanisms underlying spiritual experiences.

The ACS integrates information from diverse functions mediated by numerous hubs that form the network based in the subcortical connections of the brainstem, with an insula loop, the cingulate cortex, and the thalamus. This network provides the core interoceptive circuit that links sensory and interoceptive sources with emotional systems to generate raw feeling states and assessments of their significance.

The basic hubs of the ACS include the following:

The brainstem and hypothalamus provide homeostatic regulation of stress and soothing. Specifically, these core brain areas play a role in the production of primordial affective and motivational states (anxiety, pain, fear, and panic, as well as care and wellbeing). These subcortical emotional systems operate mostly outside of conscious control and attribute arousal, emotional meaning, and salience. These interoceptive emotional processes orient the affective valance of the self.

The insula is prominent in providing interoceptive awareness—the ability to perceive and interpret internal bodily sensations, such as hunger, thirst, heart rate, and emotions, in order to understand how the self is feeling. The insula interacts with cortical representation of the ACS via the prefrontal cortex and somatosensory cortices.

The anterior cingulate and cingulate cortex support motivational–affective processes linking affect and behavior.

Global integration is provided by the **thalami**, which integrate core feeling states and broadcast them across the cortex to allow bodily feelings to form the basis of a unified conscious self by integrating affective processes into conscious experience.

The role of the raw feelings of the ACS in spiritual experience is illustrated by the direct relationships between the basic functions of the primary affective

systems and the central emotions of spirituality, which are reflected in feelings of awe, bliss, connectedness, peace, and reverence (Panksepp 2011a, 2011b). The role of the ACS in spiritual experiences is illustrated by these homologies between spiritual emotions and the functions of the primary affective systems. There are further homologies between the basic ACS functions and characteristics and the frequent manifestations of spiritual experiences. The ACS is rooted in bodily feelings, especially emotional warmth and feelings of caring, a calm interoceptive state of positive visceral conditions and emotional stasis, which fosters an overall general wellbeing. The ACS produces feelings often associated with the sacred, such as powerful affective experiences marked by sensations of warmth, energy, tingling, bliss, and joy, accompanied by physiological calm and a profound sense of aliveness and unity, with deep embodiment and emotional resonance. ACS functions can produce experiences that are homologous with specific forms of spiritual experiences, profound emotional peace, and ego dissolution, leading to experiences of radiance, mystical rapture, contemplative absorption, and self-loss in experiences of merging into a unity of consciousness with everything.

These core aspects of ACS and spiritual experiences reflect the functions of intensified interoceptive and primary emotional circuits with downregulation of body-boundary maps and threat systems that support an experience of an envelopment by and integration and unity into a meaningful embodied consciousness. Profound meaning is associated with the various functions of the ACS component systems, which provide strong interoceptive signals, promoting autonomic calm and positive emotional salience as well as safety, with a sense of embodied vitality and feelings of unity. ACS neural circuitry regions are all located in the lowest, most ancient parts of the brain. These all have key functions related to spirituality experiences, particularly the periaqueductal gray (PAG), a central node in mammalian attachment systems and a key part of the neural substrate of the ACS. The PAG contributes to the emotional core of spiritual and mystical experiences by producing raw primordial affective states such as bliss, compassion, emotional release, peace, safety, surrender, and tenderness (see Panksepp 2011b; Engström et al. 2010; Lutz et al. 2008; Solms 2021).

We hypothesize that the positive emotional intensity of spiritual states reflects the direct effects of this and other ACS circuits. For example, the activation of the ventral striatum, which engages reward and motivation salience, has been associated with awe, bliss, and feelings of devotion (Blood and Zatorre 2001; also see Keltner and Haidt 2003). The anterior insula, which integrates interoceptive signals with emotional awareness, has been connected with the experience of a “felt being” and feelings of mindfulness (Craig 2009; Farb et al. 2007). The thalamus, the brain’s central relay, integrative, and regulatory hub, is associated with feelings of mental clarity, unity, arousal, and general mystical states (Newberg,

d'Aquili, and Rause 2001b). The amygdala, a central limbic hub with functions of attributing emotional meaning, autonomic regulation, and affiliative behavior, is associated with feelings of awe, surrender, and spiritual love (Yaden et al. 2017). In conjunction with the adjacent hippocampus, these limbic structures are also primarily involved in memory consolidation, which might help explain why mystical experiences have such a profound and long-lasting effect. Finally, the brainstem is involved with affective systems, the core self, and perhaps even proto-consciousness (Panksepp 2011a, 2011b; Solms 2021).

There are diverse spiritual effects that are homologous with the core characteristics and functions of the ACS. These homologies reflect the basis of ACS in the basic affective circuitry of the mammalian affective systems and the structure of the ACS in the integration of many hubs, themselves composed of diverse functions and effects that produce an integrative experience of positive wellbeing. While the ACS is always operative, even during sleep, it primarily comes to the forefront of consciousness and identity when the other self-systems are in abeyance. While experiences of the ACS can be accessed with introspective reflection and meditative states, their powerful engagement with personal consciousness primarily occurs with the downregulation of the parietal system and its embodied self, as well as the DMN and the narrative self. Then, the salience and interoceptive systems become dominant, and thalamic integration increases, providing the core dynamics of the ACS and associated elements of spiritual experiences.

Spirituality and Forms of Selfhood

Spiritual experiences have different effects on each of the major forms of Selfhood: the minimal, embodied, narrative, and affective selves. The minimal self is experienced as a pre-reflective awareness of self-as-subject with a first-person perspective on the environment, based on identification with the body and its point of view, and the feeling that one's thoughts, sensations, and perceptions are their own. Spiritual experiences typically have little effect on the minimal self, with the sense of being a subject of experience remaining largely intact, although this sense sometimes may be diminished.

The embodied self, acting through the body, is an agent that can act in the world by controlling the body and engaging in actions through it. The effects of spirituality on Selfhood are most pronounced in the embodied self, leading to a loss of body boundaries and body schema, as well as loss of the sense of body location, ownership, and agency. The embodied self is the one most likely to be severely disturbed, and even disappear, during spiritual states. The embodied self is based on the integration of information from the sensorimotor network that is transmitted to the parietal cortex and the premotor circuits, PMC, and SMA. Consequently, the downregulation of the rPL would directly incapacitate the neural connections that are at the basis of the embodied self. The disruption

of the parietal–premotor loop that produces the embodied self allows the emergence of spiritual states.

Spiritual experiences may also dramatically reduce the narrative and autobiographical selves, which are generally reduced during spiritual experiences. Diminution of the narrative self is illustrated by reduced rumination, a decrease in self-talk (internal dialogue), and a reduction in recall of autobiographical identity, leading to a decline in egoic preoccupations and the emergence of a “quiet mind” with immersion in the present moment. Loss of the embodied and narrative self leads to spiritual experiences.

As shown earlier, it is the ACS that shows a positive relationship to characteristics of spiritual experiences. The ACS functions express spiritual characteristics in features such as overwhelming emotional warmth and feelings of caring, as well as powerful affective experiences with sensations of calm and acceptance. Frequent spiritual features such as warmth, energy, tingling, bliss, joy, and physiological calm reflect ACS functions. The ACS functions produce experiences such as a powerful sense of aliveness and unity typical of spiritual experiences, as well as radiance, mystical rapture, contemplative absorption, and self-loss, providing deep emotional integration and unity of personal consciousness with the cosmos. The core functions of the ACS produce spiritual experiences through the intensification of interoceptive and primary emotional circuits during the downregulation of body-boundary processes and threat systems, which fosters deep embodiment and support, leading to an experience of emotional resonance with an enveloping “Other.” The spiritual aspects of the ACS are notably derived from the functions it produces rather than just because of the suspension of the functions provided by the rPL and DMN, illustrating the primordially of the ACS in generating spiritual experiences.

Roles of the Right Hemisphere in Spiritual Experiences

This section shows that there is a close relationship between the ACS and the functions of the right hemisphere, reflecting right-hemisphere functions in the processing of emotional and interoceptive dynamics, affective tone, and emotional meaning. While the ACS is bilateral in the lower brain regions, at the level of cortical integration and expression, it is strongly lateralized in the right hemisphere, reflecting right-hemisphere dominance in emotional regulation, autonomic monitoring, and interoceptive and body awareness. The strong autonomic reactions and states of affective arousal associated with some spiritual experiences attest to their engagement of the autonomic nervous system, reflecting right-hemisphere capacities that integrate visceral processes and information (Newberg and Iversen 2003). Right-hemisphere structures play central roles in converting the ACS processing of affective and interoceptive states into subjective experience, emotional meaning, and conscious self-

awareness, particularly through the right insula's roles in interoception, subjective feelings, and emotional bodily awareness; right anterior cingulate regulation of affective arousal; rPL roles in embodiment and self-environment differentiation; and rTPJ integration of emotions and body schema (Craig 2009; LaVarco et al. 2022; Northoff and Bermpohl 2004; Schore 2021).

The relationships of many religious and spiritual experiences to right-hemisphere processes are detailed by Iain McGilchrist (2019a, 2019b). This research illustrates the need for a nuanced view that contrasts everyday religion—which is based in the right fronto-temporal networks and involves doctrines, beliefs, and convictions—with the ecstatic religious experience, which has affective and somatic dimensions and is more localized to the right temporal region. McGilchrist reviews extensive clinical and psychological research on hemispheric differences (which we cannot cite here for reasons of word count). McGilchrist concludes that although spiritual experiences involve both cerebral hemispheres, many aspects of these experiences reflect the distinctive cognitive and meaning-making processes of the right hemisphere.

Evolutionary adaptations have given us two distinctive attention systems: a left hemisphere, narrowly focused capacity to avoid predators and manipulate the environment, and a right-hemisphere system with a broad and open sustained vigilance to relate to the environment holistically, particularly to detect novel stimuli in the background or periphery. Right-hemisphere vigilance enhances awareness, allowing the person to see authentically, to perceive situations in a fresh light without the left hemisphere imposition of expectations based on past familiarity.

McGilchrist (2019a, 2019b) suggests that the right-hemisphere capacity to perceive broadly integrates understandings, sustains ambiguity, and provides nonlinguistic insights that enhance its ability to capture and express religious thought and experience. Right-hemisphere functions have direct implications for understanding religious experiences due to the nature of their approaches to broadly understanding reality. The right hemisphere is preferentially engaged in novel experiences and knowledge acquired by personal encounter, being especially receptive to things in both physical and imaginary worlds that are different from what is already known. The right hemisphere is more open to spiritual experiences and interpretations because it is receptive to the unknown and unexpected and possibilities beyond the realm of everyday experience. “Right hemisphere is more capable of apprehending the nature of the world and the possible role of the divine in it than is the left hemisphere” (McGilchrist 2019a, 328).

The right hemisphere can simultaneously entertain what appear to be conflicting positions, including ambiguity and paradoxes that encompass the whole truth about reality, which are often expressed as core realizations of mystical traditions. The right hemisphere is open to environmental elements

that are not task relevant and outside of expectations through relationships established in an interconnected context that gives them meaning. The core of religious experience involves understandings that cannot be grasped by logical thought and language. The right hemisphere provides contextual understandings, such as those conveyed in metaphor, myth, and analogy, which offer insights into pragmatics (meaning in context). The right hemisphere has a greater capacity for empathy and understanding others' perspectives and intentions (McGilchrist 2019a, 2019b).

The spiritual "Other" and sacred reality, qualitatively apart from everyday life, are more accessible to right-hemisphere processes that emphasize an open, relational awareness of that which is "beyond" our ordinary conceptual frameworks. The right hemisphere's relational and contextual mode of perception parallels spiritual experiences of being embedded in a broader, more inclusive whole. This inclusivity is exemplified in spiritual experiences that present a lack of distinction between the self and its environment, instead fostering an intimate relationality with others, including spiritual entities. The spiritual encounter exemplifies the right-hemisphere mechanisms of knowing through acquaintance, with the encounter of the spiritual "other" exemplifying the operation of the right-hemisphere operations involving social cognition processing, especially theory of mind.

The right hemisphere engages knowledge and truth through mythos rather than the explicit left-hemisphere logos, providing a medium for accessing truths about the world that differ from the rationality of Logos, especially as expressed in myths and visual iconic symbols that offer both contextual meanings and higher universal truths. The ubiquitous nature of spiritual experiences as something ineffable, beyond words, illustrates the abandonment of the left-hemisphere linguistic frameworks, which are replaced with the right-hemisphere nonverbal semantic systems and meaning. The understanding provided by the right hemisphere can grasp metaphor and mythic images, the implicit meanings of music and poetry, and the expression in the behaviors of drama and ritual.

Right-hemisphere capacities produce a broad awareness that enables tolerance of ambiguity and holistic processing styles, facilitating spiritual experiences and their ineffable meanings, as well as a sense of unity and wholeness. Right-hemisphere processes produce an integration of embodiment with positive affective states and holistic information processing that reflects the phenomenological qualities of strong spiritual experiences. The right hemisphere supports an information processing style conducive to spiritual experiences, characterized by a felt sense of meaning and transcendence resulting from reduced boundaries between the self and others. Right-hemisphere processes also contribute to spiritual experiences by accommodating ambiguity, even contradiction, expressed in metaphors that facilitates an understanding of nonverbal, "numinous," and "ineffable" qualities and meanings.

Conclusions: Spiritual Experiences as Evolution or Devolution?

The term “transcendence,” like “transpersonal,” implies going beyond the ego or the personal and moving beyond their normal functions. “When describing spiritual transcendence, it is often said that it is the ego, the self, or the individual identity that is being transcended to attain spiritual connection” (Johnstone and Cohen 2019, 40). While the concept of transcendence implies this movement beyond, we argue that the movement involved in bringing us to spiritual experiences is not beyond, as in outwards or upward. Instead, this movement is internal, a descent or retreat within cognitive and self-structures of the ACS and forms of auto-reference that preceded the ego and rational intellect.

The notion of the evolution of spiritual capacities is a complicated question because the brain areas that are downregulated in spiritual experiences, specifically the parietal lobes, include areas of the brain that have undergone significant increases relatively recently in human evolution. This is evidenced in their larger volume in humans, even in comparison to other species of the *Homo* lineage. This recent evolution is exemplified by the precuneus, a central hub located in the posterior parietal cortex, which is connected to both structural and functional brain networks. The precuneus is also part of the DMN and integrates information from diverse brain regions to contribute to high-level cognitive functions. The longitudinal expansion in the enlargement of the parietal region is a relatively recent development in human evolution, unique to *Homo sapiens*, occurring approximately 150,000–200,000 years ago (Bruner et al. 2017).

Since some functions of the parietal region appear suspended or even lost in spiritual experiences, we should question if the region is a specific source of spiritual experiences. For example, the suspension of recent evolutionary aspects of the brain, such as the parietal lobe’s precuneus during meditation (see Berkovich-Ohana, Glicksohn, and Goldstein 2020) illustrates that spiritual experiences do not derive from recently evolved human capacities. Instead, capacities for spiritual experience are masked by the more recently evolved neurological structures, with evolution changing how we relate to more basic aspects of experience that support spirituality. Humans’ spiritual experience may be viewed in this light as a reversion to an earlier capacity for experience rather than something unique to advanced human cognitive capacities and experiences.

This is illustrated in the connections between the affective self and spirituality, which Newberg (2024) examines in the common neurological foundations for ritual and sexuality. These connections are exploited by ritual to enhance experiences of attachment and sacredness through stimulating the brain’s bonding processes and contributing to experiences of unity. Ritually embedded sexual practices intensify ritual’s neurological effects on the limbic regions and parietal lobe functions that have central roles in producing the self and a sense of sacredness. Hormone release resulting from sexual orgasm and afterglow

stimulates neural circuits that induce experiences of bonding, reduce self–other boundaries, and induce ASCs experienced as spiritual transformation.

Explaining the role of the parietal lobe in producing our sense of a separate identity and the role of the ACS in providing the content of spiritual experiences might be considered relatively “easy problems” of consciousness, given what we know about their specific functions (i.e., maintaining a sense of separation between our body and the environment and providing a range of positive mammalian affective qualities). Diminished parietal functions lead to experiences of greater unity and a sense of the inclusion of others within our identity. The ACS provides the positive emotional experiences of spiritual relations. This perspective provides a basis for a neurophenomenological understanding of some forms of spiritual experiences due to the loss of functions that provide a sense of separation of self from others. But more fundamental than these suspensions are the active roles of the ACS circuits in producing the experiential components of spiritual experiences.

Determining that specific brain regions are active (or inhibited) during certain “spiritual” experiences or ASC (or even psychedelic states) is a step in explaining their causal mechanisms. However, these correlations do not establish what causes the states. However, they may inform our explanations of the content and experiential qualities of these states. These explanations require the linkage of two arenas of observation: first-person experience and the associated functional brain dynamics. By linking experience to neuropsychology and identifying their homologies, we can begin a neurophenomenological science of spiritual experience. The identification here of the characteristics of spiritual experiences as homologous with the functions of the ACS and the right hemisphere is significant evidence for their deep interconnection. It extends the neurophenomenological perspectives on the self and spirituality.

These neurophenomenological relationships play an important role in elucidating the intersections between brain functions and spiritual consciousness, as well as their implications for the experience of the self. Spiritual experiences can emerge with the loss of DMN regulation and coherence, which allows consciousness to reconnect with the ancient ACS systems. The PAG anchors the raw feelings of bliss, compassion, and safety; the thalamus provides a sense of arousal and unity; the ventral striatum engages awe, devotion, reward, and motivational salience; the amygdala assigns positive emotional salience of love, surrender, and affiliation; and the insula integrates these primordial feelings into a sense of an integrated self with embodied presence.

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Competing Interests

The authors declare that they have no competing interests.

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Process Philosophy and Exceptional Experience: Whitehead and the Wild(er)ness of Non-Sensory Perception

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The purpose of this article is to demonstrate and elucidate the fruitfulness of Alfred North Whitehead's doctrine of non-sensory perception for exceptional forms of experience. I begin by introducing Whitehead's work, influence, and some of the characteristic ideological transitions associated with his thought. I then draw attention to his methodology as a form of radical empiricism beyond that of William James and review some of his central critiques of philosophy and science in light of them. Against the problematic modern assumption that all experience is mediated through the clarity of conscious sense perception, I then move to articulate his wilder doctrine of the primacy of non-sensory perception, of which conscious sense perception is a heightened, albeit narrower, delimitation, showing that this dual theory of perception provides a viable conceptual means of approaching exceptional forms of experience. Turning to recent examples of process philosophers extending and applying Whitehead's doctrine of perception, I focus on religious or mystical experiences of God, paranormal or parapsychological phenomena, and psychedelic experiences. Finally, I connect the discussion to recent neuroscience, suggesting that the hemisphere hypothesis of Iain McGilchrist may provide neuroscientific support for Whitehead's dual theory of perception, including the conviction that the function of the brain with respect to the mind is not to produce the mind as such but to limit its inclusion so that waking consciousness is actually possible. I conclude by briefly commenting on the nature and importance of spiritual practice.



A new idea has its origin in explicit consciousness by reason of some relevance to the immediate situation. The first task is to appreciate the reason for its origin. What are the factors, logical, emotional, purposeful, or of direct novel perception, which have led to its appearance and its prevalence? . . . In respect to our reactions to novelty we are still living in the ancient Ages of Faith. “What went ye out into the wilderness to see? A reed shaken by the wind?”

Alfred North Whitehead, *Science and Philosophy*

Introduction

Alfred North Whitehead (1861–1947) developed one of the most profound expressions of a dynamic and experiential universe in the history of philosophy. Overcoming the inadequacies of “scientific naturalism,” with its mechanism and materialism, his “philosophy of organism” is remarkably inclusive in scope, incorporating not only the best of twentieth-century science but also perennial forms of aesthetic, moral, and religious experience belonging to the cosmological witness of the human condition (Whitehead 1967a). For decades, process philosophers and theologians have mined the insights of Whitehead’s “radical empiricism” (as indebted to William James) with the conviction that his “panexperientialist” metaphysics sheds light not only on mundane experience but also various forms of exceptional experience (Griffin 1998, 2022). In doing so, they have reasserted his conviction that “[t]he rejection of any source of evidence is always treason to that ultimate rationalism which urges forward science and philosophy alike” (Whitehead 1929, 50).

Of particular relevance in this regard is Whitehead’s wilder doctrine of non-sensory perception. Contrary to modern dogmas of sensate empiricism, which equate perception with sense perception, and thereby exclude (or explain away) exceptional knowledge and/or experience by definition, Whitehead argues that the clarity and distinctness of our conscious sense perceptions are a high abstraction from a more fundamental non-conscious and non-sensory perception of a vast wilderness of local and cosmic relations (Whitehead 1985, 1978, chap. VIII). What resides “out there” beyond and below the confines of sense perception? Although Whitehead emphasizes the necessity of non-sensory perception to satisfy commonsense presuppositions of science and philosophy, he remained open to evidence suggesting that insights, elements, or entities of this wilderness, usually hidden within its depths, can rise to the level of consciousness in certain exceptional moments. Indeed, process philosophers and theologians have extended and applied the wild(er)ness of Whitehead’s dual theory of perception to various mystical, parapsychological, and psychedelic states and drawn wide-ranging insights from ancient spiritual wisdom to contemporary neuroscience, where mind and brain are not identical but interact through transmissive or permissive relations. What is more, they have variously discussed the nature of spiritual practice as a means by which we render more transparent the wilderness below waking sense perception.

The purpose of this article is to elucidate and expand upon these points and therefore demonstrate the fruitfulness of Whitehead's doctrine of perception for exceptional forms of experience. I begin by introducing Whitehead's work and influence and some of the characteristic ideological transitions associated with his thought. This will help set the context for those unfamiliar with Whitehead's general philosophical vision. I then draw attention to his methodology as a form of radical empiricism beyond that of James and review some of his central critiques of philosophy and science in light of them. Against the problematic modern assumption that all experience is mediated through the clarity of conscious sense perception, I then move to articulate his wilder doctrine of the primacy of non-sensory perception, of which conscious sense perception is a heightened, albeit narrower, delimitation, showing that this dual theory of perception provides a viable conceptual means of approaching exceptional forms of experience. Turning to recent examples of process philosophers applying Whitehead's doctrine of perception, I focus on religious or mystical experiences of God, paranormal or parapsychological phenomena (PSI), and psychedelic experiences. Finally, I connect the discussion to recent neuroscience, suggesting that the hemisphere hypothesis of Iain McGilchrist may provide neuroscientific support for Whitehead's dual theory of perception, including the conviction that the function of the brain with respect to the mind is not to produce the mind as such but to limit its inclusion so that waking consciousness is actually possible. I conclude by briefly commenting on the nature and importance of spiritual practice.

Whitehead's Work and Influence: Context and Philosophical Transition

Whitehead was born on February 15, 1861, in Ramsgate, Isle of Thanet, in Kent, England. After his adolescent years at Sherborne Boarding School (1875–80), his scholarly life traversed three main periods, each associated with a respective institution. The first was Trinity College at the University of Cambridge in England (1884–1910), where, being first and foremost a mathematician, he focused upon various issues related to mathematics and logic. Of particular note in this period is the beginning of his ten-year collaboration with his student and later colleague Bertrand Russell (1872–1970) on the three volumes of *Principia Mathematica* (1910, 1912, 1913), which attempted (unsuccessfully) to develop a logical foundation for mathematics. “The ambition of the *Principia* is to explain how the whole of mathematics can be developed from the concept of classes and correlations alone,” Rémy Lestienne states (2020, 12). According to Victor Lowe (1985, 291), Kurt Gödel's (1931) famous incompleteness theorem “proved the existence of an undecidable formula in any formal system adequate to number theory, and the impossibility of proving the consistency of such a system within the system.”

The next period was that of University College, London (1910–24), in which Whitehead (1967c, 1–2) expanded his focus to different problems in physics, philosophy of science, and the philosophy of education, arguing that proper education is always a protest against “inert ideas” with the purpose of guarding “against mental dry rot.” Notable texts in this period include *An Enquiry Concerning the Principles of Natural Knowledge* (1919), *The Concept of Nature* (1920), and *The Principle of Relativity* (1922), in which he provides an alternative to Einstein’s theory of relativity, protesting not against relativity as such but against Einstein’s inadequate philosophical assumptions. In Whitehead’s (1964a, x) judgment, Einstein’s assumptions had “cramped the development of his brilliant mathematical method in the narrow bounds of a very doubtful philosophy.”

His final period—and most significant for our purposes—was that of Harvard University, Cambridge, Massachusetts in the United States (1924 onward). It was a dreary day in England when a letter arrived inviting Whitehead to occupy the Chair of Philosophy at Harvard University. He was sixty-three years old and had never taught a course in philosophy, but he always wanted to. Whitehead’s wife Evelyn read the invitation herself before handing it to him (he was sitting fireside). After he read it, she asked: “What do you think of it?” He responded: “I would rather do that than anything in the world” (Price 2001, 7–8). Whitehead and Evelyn would soon board the *SS Devonian* to Massachusetts and begin what would become the most important and productive period of his scholarly life: the “Harvard Period.” As Russell (2021, 84) would later write: “In England, Whitehead was regarded only as a mathematician, and it was left to America to discover him as a philosopher.”

It was during these Harvard years that Whitehead explored a wide range of themes in the form of lectures and books—from the history and philosophy of science to the growth of civilization, the philosophy of history, the philosophy of education, and most rigorously, a comprehensive vision of reality informed by the best of twentieth-century science, including quantum and relativity theories, developmental biology, psychology, and—lord of all—cosmology. This constellation of topics found expression in a variety of seminal publications that would inspire generations of thinkers—“process philosophers” and “process theologians”—to apply Whitehead’s ideas to a host of issues in philosophy, science, religion, education, ecology, and many other fields.

Among these publications are *Science and the Modern World* (1925), *Process and Reality* (1929), and *Adventures of Ideas* (1933). These three books, Whitehead (1967b, vii) states, “are an endeavor to express a way of understanding the nature of things, and to point out how that way of understanding is illustrated by a survey of the mutations of human experience.” These are not the only texts from his Harvard period. There is also *Religion in the Making* (1926), *Symbolism: Its Meaning and Effect* (1927), *The Function of Reason* (1929), *The Aims of Education* (1929), *Modes of Thought* (1938), and finally, *Essays in Science and Philosophy* (1947), published just before his passing in 1947 from a cerebral hemorrhage at the age of eighty-six.

For Whitehead, to speak of “a way of understanding the nature of things” is to speak of the need for a new metaphysics. This was not some personal need for him but a result of the fact that the advance of the sciences (e.g., physics, developmental biology, psychology, physiology) had shown that the dominant form of mechanistic metaphysics associated with what he termed “scientific materialism” was woefully inadequate. “The progress of science has now reached a turning point,” he states. “The old foundations of scientific thought are becoming unintelligible” (Whitehead 1967a, 16). Writing in 1925, he communicates these “old foundations” in the following way:

There persists, however, throughout the whole period the fixed scientific cosmology which presupposes the ultimate fact of an irreducible brute matter, or material spread throughout space in a flux of configurations. In itself such a material is senseless, valueless, purposeless. It just does what it does do, following a fixed routine imposed by external relations which do not spring from the nature of its being. It is this assumption that I call ‘scientific materialism.’ Also it is an assumption which I shall challenge as being entirely unsuited to the scientific situation at which we have now arrived. (Whitehead 1967a, 17)

Indeed, Whitehead saw the fall of “scientific materialism” as an opportunity to develop a new “organic realism” as a part of a wider “philosophy of organism” better suited to what the sciences—especially physics—were revealing. Note his emphasis:

In the language of physical science, the change from materialism to ‘organic realism’—as the new outlook may be termed—is the displacement of the notion of static stuff by the notion of fluent energy. Such energy has the structure of action and flow, and is inconceivable apart from such structure . . . But what has vanished from the field of ultimate scientific conceptions is the notion of vacuous material existence with passive endurance. . . . Some features of the physical world can be expressed in that way. But the concept is useless as an ultimate notion in science and in cosmology. (Whitehead 1978, 309)

This transition from scientific materialism to organic realism can be expressed in the general analogical transition from a mechanistic conception of nature to an organic conception of nature. As R. G. Collingwood (1960, 170) demonstrates, Whitehead represents the modern renewal of the ancient Greek vision of nature as a vast organism: “Thus the cycle of cosmological thought in the modern world, from Descartes and Newton to Whitehead, recapitulates the cycle running from Thales to Aristotle. But that recapitulation is not a mere repetition.”

Although the rise of modern science vanquished this organic conception through the mechanism and materialism of René Descartes and Isaac Newton, science had facilitated its novel return. Collingwood (1960, 166–67) clarifies,

“When Whitehead constantly asserts that reality is an organism, he does not mean to reduce all reality to biological terms; he only means that every existing thing resembles a living organism in the fact that its essence depends, not on its components merely, but on the pattern or structure in which they are composed.” Rather than a reduction of reality to that of biological terms, Whitehead (1967a, 103) generalized biology, holding that “[s]cience is taking on a new aspect which is neither purely physical, nor purely biological. It is becoming the study of organisms. Biology is the study of the larger organisms; whereas physics is the study of the smaller organisms.” A fuller thematic expression of the transition from a mechanistic to an organic universe is expressed in Table 1.

Mechanistic conception	Organic conception
Like a deterministic machine	Like a growing organism
Self-sufficient material units	Living, relational happenings
Relations external to what things are	Relations internal to what things are
Not constituted by relationships	Fundamentally constituted by relationships
Determined by prior external causes	Self-organizing and internally dynamic
Causation as force transmission (push and pull)	Causation as influence, responsiveness, and participation
Change as rearrangement of parts	Change as emergent development
Primarily quantitative description	Qualitative as well as quantitative description
Clock, watch, engine	Plant, animal, ecosystem

Table 1: A thematic comparison of mechanistic and organic universes.

This transition is not merely analogical for Whitehead, but ontological. In other words, it also necessitates a deeper transition from substance ontology to process ontology. Collingwood (1960, 167) continues: “Nature, for Whitehead, is not just organism, it is also process. The activities of the organism are not external accidents, they are united into a single complex activity which is the organism itself...This is the basic principle grasped by him with unusual tenacity and clearness, and taught to him, by his own account, by modern physics with its new theory of matter. The process of nature is not a merely cyclic or rhythmical change, it is creative advance.” Table 2 expresses some of the thematic tenants involved in the transition from a substance to a process ontology.

Although elements of process have been a part of the Western philosophical tradition since Heraclitus, the historical trend of philosophy largely took the path of Parmenides and the Atomists. Whitehead (1978, 208, 309), however, stands in the Heraclitean tradition and seeks to reawaken attention to “one chief task of metaphysics,” namely, the elucidation that “all things flow.” “Reality is not static,” he states, “it is a process of becoming. The fluent character of the togetherness of things was already emphasized in Greek philosophy: All

Substance ontology	Process ontology
Things (noun-entities)	Happenings (verb-entities)
Self-contained identity	Identity constituted by relations
Discrete individuality	Interdependence and relationality
Relations external or secondary	Relations internal and constitutive
Identity prior to relation	Relation prior to identity
Change as modification of underlying substance	Change as ontologically fundamental
Persistence through time	Temporality intrinsic to being
Stability and endurance	Creativity and emergence
Stone, pyramid, statue	Stream, river, rain
Being as primary	Becoming as primary

Table 2: A thematic comparison of substance and process ontology.

things flow, said Heraclitus. Indeed the fact is too obvious to escape notice. But unfortunately, things which are too obvious often escape receiving their due emphasis” (Henning and Petek 2021, 50).

Generally speaking, then, to be a process thinker is to recognize the elements on the right side of the transitional list in Table 2 as primary and those on the left side as secondary. Moreover, it is Whitehead’s unique expression of these transitions, with their various implications, that is at the heart of modern process philosophy and theology and the variety of interdisciplinary concerns extending from them, from ecological thought (Cobb 1972) and environmental ethics (Henning 2024) to philosophy of religion (Griffin, 2001), quantum mechanics (Epperson 2004; Eastman and Keeton 2003), cosmology (Davis et al. 2022; McHenry 2015), theoretical biology (Koutroufinis and Araujo 2023; Cobb 2008), education (De Jonghe 2022), economics (Daly and Cobb 1994), and political philosophy (Dombrowski 2019). As we proceed, we will see how and why Whitehead’s thought has also inspired a variety of contributions engaging exceptional forms of experience. Before we come to this, however, I first need to articulate the central conviction from which his methodology extends, including some of his related critiques of modern philosophy and science.

Empiricism Radicalized: Methodology and Critique

Whitehead was a great admirer of William James, and he stood in his tradition of “radical empiricism” at Harvard University. Whitehead (1967a, 2–3) praised James as an “adorable genius” because he never let go of “irreducible and stubborn facts” of human experience. As Whitehead (1968, 3) states: “His intellectual life was one protest against the dismissal of experience in the interest of system.” Indeed, according to James (1976, 22), “[t]o be radical, an empiricism must neither admit into its constructions any element that is not directly experienced, nor exclude any element that is directly experienced.” With James, Whitehead (1967b, 226) too protests the dismissal of any experience,

insisting that the “whole of experience” must be taken into account such that “nothing can be omitted.”

What is it that is so special about human experience for Whitehead? In the first place, the specialness of human experience should not be characterized anthropocentrically or anthropomorphically. Rather, it is rooted to the claim that human experience is an exemplification rather than an exception to the nature and character of this universe and what it is doing. As I argued in a previous article, human experience is an anthropocosmic fact of nature (Davis 2025). “It is a false dichotomy to think of Nature *and* Man,” Whitehead (1967b, 78) states. “Mankind is that factor in Nature which exhibits in its most intense form the plasticity of nature.” Moreover, he reminds us that “any doctrine which refuses to place human experience outside nature, must find in descriptions of human experience factors” relevant to “less specialized natural occurrences” (Whitehead 1967b, 184–85). Put differently, as long as human experience is part and parcel of nature, then there is a continuum of experience in nature. Experience, in other words, is a mode of revelation for Whitehead (1967a, 18): “To know that our experience, dim and fragmentary as it is, yet sounds the utmost depths of reality.” It is for this reason, for Whitehead (1967b, 226), that “nothing can be omitted” in the philosophical endeavor:

Nothing can be omitted, experience drunk and experience sober, experience sleeping and experience waking, experience drowsy and experience wide-awake, experience self-conscious and experience self-forgetful, experience intellectual and experience physical, experience religious and experience sceptical, experience anxious and experience care-free, experience anticipatory and experience retrospective, experience happy and experience grieving, experience dominated by emotion and experience under self-restraint, experience in the light and experience in the dark, experience normal and experience abnormal.

Process philosophers have extended this radically empirical method to exceptional forms of experience, from religious and mystical forms of experience (Cargas and Lee 1976; Dombrowski 2023) to various modalities of parapsychological experience (Griffin 1997; Kelly et al. 2009; Buchanan and Aanstoos 2020), Jungian forms of spirituality (Kling 2020), and psychedelics (Buchanan 2022; Sjöstedt-Hughes 2021; Hauskeller and Sjöstedt-Hughes 2022).

Given Whitehead’s (1978, 337) commitment to the revelatory nature of human experience, we can already anticipate one of his central critiques of both philosophy and science, namely, evidential narrowness extending from arbitrary limitations in thought:

The chief danger to philosophy is narrowness in the selection of evidence. This narrowness arises from the idiosyncrasies and timidities of particular authors, of particular social groups, of particular schools of thought, of particular

epochs in the history of civilization. The evidence relied upon is arbitrarily biased by the temperaments of individuals, by the provincialities of groups, and by the limitations of schemes of thought.

A default materialist, atheist, and sensationist metaphysics, for example, must necessarily exclude (or explain away) a whole range of both mundane and exceptional data that transcends what its limitations permit. As Whitehead (1978, 17) insists, however: "Philosophy destroys its usefulness when it indulges in brilliant feats of explaining away."

To give one potent example we will come to later, if the mind is completely reducible to brain activity, then the death of the brain requires the concomitant death of the mind, rendering the postulate of continuing postmodern adventures impossible. Nevertheless, various lines of counterevidence abound that challenge the viability of reductive materialism, including evidence of near-death experiences. We will see later that Whitehead was open to this evidence, as are process philosophers and theologians. The point stands for Whitehead (1929, 50): "The rejection of any source of evidence is always treason to that ultimate rationalism, which urges forward science and philosophy alike." His further statements expand upon these intuitions on behalf of the wider inclusion of countervailing evidence.

It is easy enough to find a theory, logically harmonious and with important applications in the region of fact, provided that you are content to disregard half your evidence. Every age produces people with clear logical intellects, and with the most praiseworthy grasp of the importance of some sphere of human experience, who have elaborated, or inherited, a scheme of thought which exactly fits those experiences which claim their interest. Such people are apt resolutely to ignore, or to explain away, all evidence which confuses their scheme with contradictory instances. What they cannot fit in is for them nonsense. An unflinching determination to take the whole evidence into account is the only method of preservation against the fluctuating extremes of fashionable opinion. This advice seems so easy, and is in fact so difficult to follow. (Whitehead 1967a, 187)

With respect to exceptional experiences, James (1960, 42), who was an active member of the American Society for Psychical Research, shares Whitehead's convictions: "Science, so far as science denies such exceptional occurrences, lies prostrate in the dust for me; and the most urgent intellectual need which I feel at present is that science be built up again in a form in which such things may have a positive place." James of course took important steps toward building up science and philosophy in this way, but he also saw that deeper constructive work was required. It is here that process philosophers have pointed to the wider resources of Whitehead's philosophy. As David Ray Griffin (2022, 41) states, "Although

James himself went part of the way to articulating such a position, the philosopher who most fully developed it was Alfred North Whitehead.” This conviction is also shared by Edward Kelly, who leads research at the Division of Perceptual Studies at the University of Virginia: “[Whitehead’s] work in fact represents the most systematic effort to date to elaborate a comprehensive metaphysical system specifically intended to be compatible with both the new basic science and with all available facts of human experience” (Kelly et al. 2009, 633).

While this article is not the place to review the comprehensiveness of Whitehead’s metaphysical vision, it is worthwhile, in view of his doctrine of non-sensory perception, to lay out a few bold points of his event-based ontology of experience and becoming. This ontology is based in:

- **The primacy of events.** The most fully actual/real entities constituting reality are momentary energetic events, not things (“matter”) that endure through time.
- **Irreducible experience.** These events are not vacuous, but experiential happenings. Whitehead (1978, 18) calls them “actual entities,” or “occasions of experience,” and they are “the final real things of which the world is made up”—a position now known as “panexperientialism.”
- **Relational constitution.** Each event is internally constituted by its relations to other events. Nothing exists in isolation; to be is to be related.
- **Active becoming.** The “happening” of these experiential events is their becoming (or “concrescence”)—their process of coming into being in response to what the past gives and what the future offers.
- **Receptive and anticipatory feelings.** Becoming is based on interior feelings (or “prehensions”) of the settled past as something to be received and conceptual feelings of possible futures as something to be achieved.
- **Dipolarity.** Every event is “dipolar,” having both a physical pole oriented toward the past and a mental pole oriented toward the future. With the physical pole, the event receives efficient causation; with the mental pole, it introduces final causation.
- **Creativity and intrinsic aim toward value.** Reality is grounded in an ultimate principle of creative advance whereby “[t]he many become one and are increased by one” (Whitehead 1978, 21). Each event integrates what it inherits and what it envisions in pursuit of intensity, harmony, or value.

What we find here is a basic outline expressing a “transition from space and matter, as the fundamental notions to process conceived, as a complex activity with internal relations between its various factors” (Whitehead 1968, 145). “For the modern view,” Whitehead (1968, 146) states, “process, activity, and change are the matter of fact. At an instant there is nothing. Each instant is only a way of groping matter of fact . . . Thus all interrelations of matters of fact must involve transition in their essence. All realization involves implication in the creative

advance.” As we move now to a deeper elucidation of Whitehead’s doctrine of non-sensory perception, we will find these points coming to life in different ways.

Whitehead’s Wilder Doctrine of Non-Sensory Perception: Prehensive Doctrine of Perception

Whitehead’s (1967b, 177–78) criticism of modern epistemology concerns its exclusive attention to sensory perception, namely, the presupposition that “all perception is by the mediation of our bodily sense-organs, such as eyes, palates, noses, ears, and the diffused bodily organization furnishing touches, aches, and other bodily sensations.” Put differently, what Whitehead calls the “sensationalist doctrine” consists in the claim that our experience of the world beyond our minds is only by means of our bodily sensory organs—the immediacy of our five senses (Whitehead 1967b, 163, 178, 224, 279–80). Indeed, this doctrine is based in the dogma that our only mode of perception is what Whitehead (1985, 13) calls “perception in mode of presentational immediacy”—that is, what is immediately presented, with clarity and distinctness, to our senses. He takes aim at Descartes, John Locke, and David Hume in particular:

When Descartes, Locke, and Hume undertake the analysis of experience, they utilize those elements in their own experience which lie clear and distinct, fit for the exactitude of intellectual discourse. It is tacitly assumed . . . that the fundamental factors will ever lend themselves for discrimination with particular clarity. This assumption is here directly challenged. (Whitehead 1967b, 175)

Why should we challenge the sensationalist doctrine of perception in the mode of “presentational immediacy”? For Whitehead and process philosophers more generally, there are at least two points worth emphasizing.

In the first place, a host of scientific and philosophical problems result from the claim that all perception is reducible to the immediacy of perceived sense data (Whitehead 1985). While time forbids exhaustive treatment of these problems, Griffin, in elucidating Whitehead’s thought, has demonstrated at length that reliance on pure sense perception alone cannot justify a host of “hardcore common-sense notions” presupposed by both science and philosophy alike. Among these are:

- the reality of an external world
- the reality of the past (and therefore time)
- the reality of causation and induction
- the reality of mathematical objectivity (platonic realism)
- the reality of logic
- the reality of axiological objectivity (platonic value realism) (Griffin 2000, 2001).

While each of these notions is arguably presupposed by human experience, they cannot find justification in sense data alone. This is a problem Whitehead (1968, 133) refused to take lightly: “My quarrel with modern epistemology concerns its exclusive stress upon sense perception for the provision of data respecting nature. Sense perception does not provide the data in terms of which we interpret it.” He continues, “In fact science conceived as resting on mere sense perception, is bankrupt, so far as concerns its claim to self-sufficiency” (Whitehead 1968, 154). It is “bankrupt” because, while it inevitably presupposes the reality of the aforementioned points, it has attached itself to a narrow epistemology that is unable to account for them.

In addition to creating severe problems for both science and philosophy, the sensationalist doctrine of “presentational immediacy” also ignores evidence to the contrary. Whitehead (1967b, 180) rightly states: “If we discover such instances of non-sensuous perception, then the tacit identification of perception with sense-perception must be a fatal error barring the advance of systematic metaphysics.” Arguably, it will also be a fatal error barring any rational approach to exceptional experiences. A natural question immediately follows: Can we detect any instances of non-sensory perception? Whitehead’s answer is not only yes but also that these “instances” are thoroughly mundane in nature.

The reason this mundanity is important for this discussion is because one might plausibly hold that any affirmation of non-sensory perception is simply (and unjustly) biased toward the justification of exceptional forms of experience. Whitehead held no bias in this way, however. He remained principally concerned with a more adequate epistemology that can justify the commonsense presuppositions of science and philosophy. Yet it just so happens that if we are able to identify “instances” of non-sensory perception on mundane levels, then we can also apply this data to realms of exceptional experience. This is my approach here and in the following section.

What then are some examples Whitehead and process philosophers give for mundane “instances of non-sensuous perception?” The first concerns the non-sensory perception of our bodily functioning. Consider the fact that when you see the beauty of the ocean, for example, you are not seeing your eyes—you are seeing *with* and *through* them. When you hear your favorite song, you are not hearing your ears—you are hearing *with* and *through* them. Similarly, when you smell your favorite meal, you are not smelling your nose—you are smelling *with* and *through* it. Griffin (2001, 62) remarks:

Our awareness of our body’s casual efficacy for our experience is due to our nonsensory perception. This perception is obviously not a form of sensory perception. I do not see my eyes or hear my ears. My capacity to enjoy sights and sounds through my eyes and ears depends upon my more basic perception of my body through which I receive the information these sensory organs

have brought in from the world beyond my body. My most *direct* perception of my body, furthermore, is not my perception of these organs but my perception of my brain.

As Whitehead (1978, 171) states: “Common sense, physical theory, and physiological theory, combine to point out a historic route of inheritance . . . first physically in the external environment, then physiologically—through the eyes in the case of visual data—up the nerves, into the brain.”

It is apparent that these statements by Griffin and Whitehead are a contradiction of the modern Cartesian dogma that the mind *experiences* but the body does not. To the contrary, Whitehead (1968, 21) would remind us that our bodies are essentially geography—as natural as “a river, or a mountain, or a cloud.” Our bodies are the most intimate part of the world that we know—and they are thoroughly experiential in nature. In every moment, our bodies receive incomprehensible amounts of data from the surrounding local and cosmic world. In truth, the whole universe begets us moment by moment, but we are not conscious—at least most of the time—of the impress of this cosmological gestalt. If we suddenly were, one can imagine this might be akin to a kind of psychedelic experience. We will revisit this later.

One way Whitehead speaks of the experiential nature of the body is through the “withness of the body” in experience. This “withness,” he states, assumes that “the predominant basis of perception is [non-sensory] perception of the various bodily organs, as passing on their experience by channels of transmission and enhancement” (Whitehead 1978, 312, 119). Our body in this regard is a “complex amplifier” that raises and, through its complex channels of transmission, filters out our non-sensory, cosmo-primal prehensions into the clarified volume of our conscious sense perceptions (Whitehead 1978, 119). We are not consciously aware of this “miraculous” coordination performed by our body, but this coordination is such as to “pour its inheritance into various regions within the brain,” thereby making conscious sense perception possible (Whitehead 1967b, 189). We will come to the function of the brain later, but the incredible role of the body and its coordinated organs is the receptive funneling of the sheer cosmological width of our non-sensory relatedness to the universe into the narrowness of our waking sense perception of our immediate environment. The prehensive functioning of our bodily sense organs does not depend upon our consciousness; however, our consciousness does depend upon the miracle of this world-to-body-to-brain complex. The data offered by the world is initially incredibly wide; it is narrowed by its entrance into the body and narrowed still further by its entrance into the brain, which facilitates the clarity and distinctness of conscious sense perception.

A second example of non-sensory perception concerns our immediate past, namely, the immediately preceding moment, as efficaciously related to

our current moment of experience. This direct influence of the past upon the present is not mediated by the senses. Whitehead (1967b, 181–82) elaborates this example as the “palmary instance of non-sensuous perception:”

In human experience, the most compelling example of non-sensuous perception is our knowledge of our own immediate past. I am not referring to our memories of a day past, or of an hour past, or of a minute past . . . But our immediate past is constituted by that occasion, or by that group of fused occasions, which enters into experience devoid of any perceptible [sensory] medium intervening between it and the present immediate fact. Roughly speaking, it is that portion of our past lying between a tenth of a second and half a second ago. It is gone, and yet it is here . . . The immediate past as surviving to be again lived through in the present is the palmary instance of non-sensuous perception.

Through what sensory means are we causally related to our previous moment of experience? It is not through our eyes or ears. In fact, there is no sensory mediation that accounts for the continuity (or unity) of one moment with another; rather, this causal continuity is based in our non-sensory prehension of the previous moment as efficaciously informing the present. “This is an instance of direct intuitive observation which is incapable of reduction to the sensationalist formula,” Whitehead (1967b, 182–83) states. “Such observations have not the clear sharp-cut precision of sense-perception. But surely there can be no doubt about them.” In contrast to “perception in the mode of presentational immediacy,” Whitehead (1978, 120–21) calls the efficacy of this non-sensory causality “perception in the mode of causal efficacy.” “It is evident that ‘perception in the mode of causal efficacy’ is not that sort of perception which has received chief attention in the philosophical tradition,” he states. “Philosophers have disdained the information about the universe obtained through their visceral feelings, and have concentrated on visual feelings” (Whitehead 1978, 121).

What we see here then is Whitehead’s essentially dual theory of perception concerning “presentational immediacy” on the one hand and “causal efficacy” on the other. It should be noted, however, that most of our waking consciousness consists in a mixed mode that he terms “symbolic reference” (Whitehead 1985, 1978, chap. VIII). “The synthetic activity whereby these two modes of perception are fused into one perception is what I have called ‘symbolic reference,’” Whitehead (1985, 18–19) states. “By symbolic reference the various actualities disclosed respectively by the two modes are either identified, or at least correlated together as interrelated elements of our environment. Thus the result of symbolic reference is what the actual world is for us, as that datum in our experience, productive of feelings, emotions, satisfactions, actions, and

finally as the topic for conscious recognition when our mentality intervenes with conceptual analysis.” As John Buchanan (2022, 86) summarizes: “Our vague, feeling-laden direct perception of past reality (causal-efficacy) is synthesized with the clarity of simplified conscious sense perceptions (presentational immediacy) to create a meaningful encounter with the world (symbolic reference).” Consider now a comparative characterization of the “two modes” that are meaningfully synthesized in waking experience.

Presentational immediacy	Causal efficacy
The world as consciously presented	The world as causally inherited
Sensory appearance in spatial extension	Non-sensory reception of the past world
Clear, distinct, and definite	Vague, massive, and affectively charged
Discriminates and locates in space	Feels temporal inheritance and influence
The immediate foreground of awareness	The unconscious depth of experience
Selective and exclusive	Inclusive and relational
Structured by geometrical form	Structured by temporal becoming
Concerned with what is present	Concerned with what has been and is acting
An abstract presentation of reality	The primitive, concrete mode of perception
A curated garden of immediate perception	The uncurated wilderness of cosmic relations

Table 3: Whitehead’s dual theory of perception.

The wild(er)ness of Whitehead’s theory extends from his conviction that “causal efficacy” is more fundamental than “presentational immediacy” (see Table 3). In holding to this, he has flipped modern epistemology on its head by affirming that the clarity and distinctness of waking sense perception is a secondary curation from a wilder and more fundamental non-sensory mode of relatedness to the vast universe as a whole. This epistemological inversion is captured in Russell’s (2021, 33) recollection of Whitehead: “It was Whitehead who was the serpent in this paradise of Mediterranean clarity. He said to me once: ‘You think the world is what it looks like in fine weather at noon day [presentational immediacy]; I think it is what it seems like in the early morning when one first wakes from deep sleep [causal efficacy]’. I thought his remark horrid, but could not see how to prove that my bias was any better than his.”

As seen, however, Whitehead’s “bias” is hardly that. To repeat: it is not only that dogmas as to the primacy of “noon day” perception face serious scientific and philosophical problems but also that there is thoroughly mundane evidence of non-sensory, “early morning” perception. We are all familiar with the amorphous feeling of emerging out of the foggiest of “deep sleep”—on a beach, say—where sights, sounds, and other sense perceptions are not clearly discernable to waking consciousness. For Whitehead, the clarity of “noon day” emerges from

the primal efficacious depths below waking perception. Consider the iceberg shown in Figure 1 as one way of picturing this dual theory of perception.



Figure 1: The iceberg of perception according to Whitehead's dual theory. Adapted from Romolo Tavani, iStock, Getty Images.

The tip of the iceberg, above the water, represents perception in the mode of “presentational immediacy.” It is our waking consciousness of the “fine weather at noon day”—a clear perceptual forecast of sights, sounds, and feelings, from the gentle breeze in our hair to the warmth of the sun on our skin. When you dip below the ocean, however, you find that deep below waking perception is the wild(er)ness of causal efficacy that always informs—but most of the time escapes—conscious awareness.

Whitehead has various ways of characterizing this oceanic wild(er)ness below consciousness. He calls it a “[a] transcendent universe of other things,” with “characters mysteriously moulding our own natures,” “controlling presences,” “sources of power,” and a depth that is “the root of the pathos which haunts the world” (Whitehead 1967b, 180; 1985, 44, 47, 57). In view of rationalizing exceptional experiences, we can now ask the following questions: What dwells in the oceanic wilderness below waking sense perception? God? Other spiritual beings, entities, or dimensions? Infinitudes of platonic-like rational, moral, and aesthetic truths? Vast paranormal relations? Perhaps other domains that escape the limited grasp of waking sense perception? Fundamental to Whitehead's theory is that we are—most of the time—simply unaware of the vast influences extending from our deeper ontological relatedness to the cosmos. Notice the descriptive ways in which he distinguishes “presentational immediacy” from “causal efficacy”:

One part of our experience is handy, and definite in our consciousness; also it is easy to reproduce at will. The other type of experience . . . is vague, haunting, unmanageable. The former type, for all its decorative sense experience, is barren. It displays a world concealed under an adventitious show, the show of our own bodily production. The latter type is heavy with the contact of the things gone by, which lay their grip on our immediate selves. This latter type, the mode of causal efficacy, is the experience dominating the primitive living organisms. . . . It is heavy, primitive experience. The former type, the presentational immediacy is the superficial product of complexity, of subtlety; it halts at the present, and indulges in a manageable self-enjoyment derived from the immediacy of the show of things. (Whitehead 1985, 43–44)

In saying that “causal efficacy” is the “experience dominating the primitive organisms,” Whitehead is extending experience far below what is expressed in the conscious experience belonging to human and other complex animals. Against the wider backdrop of nature, consciousness—and surely meta-consciousness—seems unique and rare, but experience as such is not. Whitehead’s “panexperientialism” is distinguished from common renderings of “panpsychism” in that experience goes all the way down, but consciousness does not. Experiential prehension, in other words, is deeper than conscious apprehension.

An electron is an example of a “primitive living organism” in Whitehead’s universe. While it lacks conscious apprehension, it is fundamentally constituted by means of its prehensions as a non-conscious but thoroughly experiential mode of receptive feeling of its environment. “But mankind has gained a richness of experiential content denied to electrons,” Whitehead (1985, 28) states. Indeed, consciousness emerges much later (and higher) along the achievements of evolutionary complexity. It emerges not from vacuous, dead matter but from primitive forms of experience that are never wholly absent from nature. As Whitehead (1978, 267, 162) states, “Consciousness is the crown of experience, only occasionally attained, not its necessary base” and it “can only arise in a late derivative phase of complex integrations [of experience].”

When the clarity of consciousness does arise in ourselves and other animals, we are—most of the time—only aware of a tiny fraction of what there truly is in the universe. As Whitehead stresses, presentational immediacy, while “handy” and “definite,” is also “barren”—the “superficial product” of a complex route of compounding layers of experience. The result of their compounding (not just “combination”) is the blooming of conscious sense perception as clear and distinct, but also a definite limitation to the universe’s wider causal efficacy upon us in ways “vague, haunting, unimaginable.” As Whitehead (1968, 43–44) communicates, the emergence of consciousness in animals and humans is uniquely based in what it omits from awareness for sake of coherent emphasis:

The rise of animal, and then human, consciousness is the triumph of specialization. It is closely connected with the evolution of clear and distinct sensory experience. There is abstraction from the vague mass of primary feelings, and concentration upon the comparative clarity of a few qualitative details. Unless the physical and physiological sciences are fables, the qualitative experiences which are the sensations such as sight, hearing etc., are involved in an intricate flux of reactions within and without the animal body. These are all hidden below consciousness . . . This feeling is massive and vague.

As Whitehead signals here, the “vague mass of primary feelings” is hidden below the iceberg of conscious sense perception. The paradox of consciousness consists in the fact that the clarity it achieves is based upon what it hides from itself. Nevertheless, in certain exceptional moments, what is hidden can become manifest.

Process Philosophers on Exceptional Experiences: Extension and Application

With the foregoing philosophical ground now laid, we turn to how Whitehead’s dual theory of perception might shed light on key examples of exceptional experience. As already mentioned, process philosophers and theologians have made profitable use of Whitehead’s doctrine with respect to a variety of exceptional experiences. These include mystical, near-death, psychedelic, and various experiences associated with parapsychological or PSI, from telepathy to clairvoyance and beyond. For our purposes, I will focus briefly on religious or mystical experiences of God, telepathy and life after death, and psychedelic experiences.

Religious or Mystical Experience of God

Whitehead advocated a unique form of what is generally referred to as *panentheism* (Gr. all-in-God). As a position, panentheism distinguishes itself from the dualism of mutual independence between God and the world found in classical forms of theism and the monistic inseparability characteristic of many forms of pantheism. Panentheism, by contrast, is based in the independence, but also the inseparability, of God and the world. For Whitehead, God is always and everywhere involved in the world, just as the world is always and everywhere involved in God. God is not identified (or identifiable) with the world, and the world is not identified (or identifiable) with God. Both retain their integrity, but never at cost to their intimacy.

This article is not the place to review and defend in detail why Whitehead admits “God” into his metaphysical vision.¹ For now, it should only be emphasized that God was not an arbitrary add-on to his mature philosophical vision but was “required” and “belonged” for descriptive completeness both rationally and empirically, but not supernaturally (Hocking 1963, 16; Johnson

1983, 4). Indeed, it is a major contribution of process theology to defend the claim that a naturalistic worldview need not presuppose atheism.² In any case, the sheer negation involved in atheism is hardly unproblematic metaphysically. At a rational level, Whitehead's "naturalistic theism" affirms God as the proper solvent to various metaphysical riddles of possibility, order, novelty, and value that really confront a universe of process. At an empirical level, he recognizes that exceptional religious and mystical kinds of experience are a pervasive historical fact, as are more mundane intuitions of values, holiness, or the sacred. Both find metaphysical justification in what Whitehead terms "God." Consider Griffin's (2014, 157–58) analogy between Whitehead's affirmation of non-sensory perception in relation to his panentheism and our relation to the neuronal cells of our brain:

According to Whitehead's prehensive doctrine of perception, which both supports and presupposes panexperientialism, we directly perceive other actual entities, all of which are occasions of experience. We most directly perceive them not through our sensory organs . . . Rather, we directlyprehend them in a nonsensory manner, as when I directlyprehend my brain cells and my past occasion of experience . . . According to the panentheistic view of reality, we are related to God somewhat like our brain cells are related to us. We are, therefore, directlyprehending God all the time, just as our brain cells are directlyprehending us.

This panentheistic analogy is not without imaginative scientific and philosophical precedent. Recent studies have expressed a "tantalizing degree of similarity" between the neurological connections of our brain cells and the galactic interconnections constituting the "cosmic web" (Vazza and Feletti 2020; Kurz and Baranes 2025; Gott 2018). Figure 2 is worthy of meditation in this regard.

Such a "tantalizing" comparison raises the imaginative possibility that we are internal cellular components constituting something of the cosmo-neurological synapses of the divine mind. Griffin (2014, 159) extends the analogy further, saying: "Our prehensions of God, like our prehension of our brain cells, are prehensions in the mode of causal efficacy, and hence are ordinarily not illuminated by consciousness. In certain extraordinary moments, however, our prehensions of God can rise to the level of consciousness. After such moments, we say that we had a 'religious' experience, an 'experience of God,' or an 'experience of the holy.'" The nature of this extraordinariness is not based in an "experience of God," since, on Whitehead's panentheistic model, we are experiencing God constantly. Rather, what is extraordinary is that this experience, extending from far below the iceberg of conscious perception, has actually risen to the clarity of "noon day." For Griffin (2014, 159), moreover, this approach carries a certain explanatory power in that it can account for the pervasiveness of religious or mystical experiences throughout history:

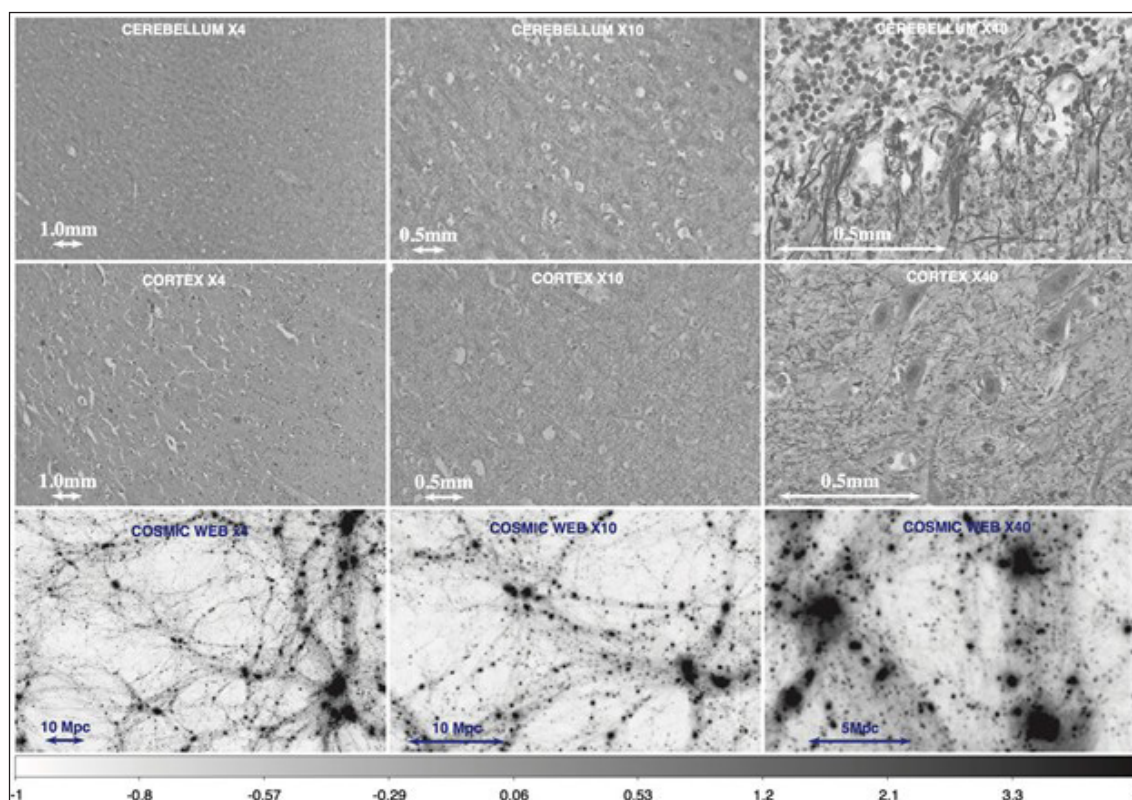


Figure 2: A comparison between the neuronal network of the cerebellum and cortex and the cosmic web at $\times 4$, $\times 10$ m and $\times 40$ magnifications. Source: Vazza and Feletti 2020, open access.

What was extraordinary about those moments, however, was not that we perceived God; we are doing that all the time. What was extraordinary was only that this perception, with its subjective form of holiness, rose to the level of consciousness.

On this basis, we can see that theistic religious experience can involve a direct experience of a Holy Actuality, in whom we live, move, and have our being. And on this basis, in turn, we can understand why human beings always and everywhere give testimony to a distinctive type of experience that we call religious experience.³

Naturally, much more needs to be added to this discussion. However, my point is merely to demonstrate the way in which Griffin has extended and applied Whitehead's wilder doctrine of perception in conjunction with panentheism to shed light on mystical or religious experiences of God.

Parapsychological Phenomena

James was a leading figure in the American Society of Psychical Research and occupied a similar role to Henry Sidgwick, who was president of the original Society of Psychical Research in London. As seen earlier, James (1990, 330) took the wild(er)ness of exceptional experience with utmost seriousness,

insisting that “psychical research and other wild beasts of the philosophical desert” must not be ignored. It stands to reason that Whitehead was aware of this research and its efforts to scientifically pierce—to the extent possible—paranormal phenomena inclusive of telepathy, near-death experience, and other forms of exceptional experience. As stressed earlier, Whitehead admired James greatly, and he also encountered and admired Sidgwick in his Cambridge years as an “Apostle” (Griffin 2022, 40, 44–45). For our purposes, attention must be drawn to Whitehead’s “revolutionary concept of prehension” in relation to the possibility of telepathy (Hartshorne 1979).

As emphasized already, prehension is a non-sensory mode of fundamental feeling. It is the basic category of receptive causation for Whitehead, and it comes in both physical and mental modes for every becoming event. Experiential events not only prehend the objectified past through a physical pole, they also conceptually prehend the unsettled future as a realm of relevant possibilities. Whitehead (1978, 107), however, also allows for what he calls “hybrid prehension” or the “prehension by one subject of a conceptual prehension . . . belonging to the mentality of another subject.” Whereas “a pure physical prehension is the transmission of physical feeling,” he tells us that a “hybrid prehension is the transmission of mental feeling” from one occasion to another (Whitehead 1978, 308). It is this “hybrid” form of prehension, in which minds are connected via the prehensive objectification of their conceptual content, that is directly relevant to instances of telepathy as feeling the conceptual feeling of another.

While Whitehead (1978, 308) admits that “physical science maintains its denial of ‘action at a distance,’” he also points to “the evidence for peculiar instances of telepathy” as empirically challenging this outright denial. For Whitehead, in fact, telepathy via “hybrid prehensions” is happening all the time, but we are usually not conscious of it. “Hence it will only be in exceptional circumstances that an immediate hybrid prehension has sufficient vivid definition to receive a subjective form of clear conscious attention,” he states (Whitehead 1978, 308). As Buchanan (2022, 43–44) rightly comments:

Whitehead’s philosophy describes a fundamental mode of [non-sensory] perception that gives direct access to all past events. Such a mode of intuitive perceptual access to the hidden depths of the universe provides a basis for understanding how telepathy might be possible, as well as analogous psychic access to other entities—potentially all past reality—including mystical experiences of God.

If a strong evidential case can be made for telepathy as mind-to-mind connection on mundane, local levels, it is not a stretch to extend this possibility to global, and indeed cosmic, levels in terms of mind-to-Mind prehensions of God. This might be framed in terms of more ordinary experience of mathematical, moral, and religious intuitions, which, although commonplace, exceed scientific

reduction; it can also be understood in light of extraordinary cases of religious or mystical awakening, rarer as these experiences are. Whatever the case, with respect to telepathy, Whitehead insists that our scientific and philosophical worldview be characterized by empirical openness rather than dogmatic closure. “[W]e must also allow for the possibility that we can detect in ourselves direct aspects of the mentalities of higher organisms,” he states, adding: “The claim that the cognition of alien mentalities must necessarily be by means of indirect inference from aspects of shape and of sense-objects is wholly unwarranted by this philosophy of organism” (Whitehead 1967a, 43–44).

This would include the mentalities of organisms or beings “higher”—perhaps much higher—than the human. While Whitehead’s use of the term “alien” suggests that which is foreign rather than extraterrestrial, I have demonstrated at length elsewhere that Whitehead and process tradition more broadly have been open to all varieties of extraterrestrial minds in the universe (Davis 2023; Davis and Faber 2024). “Perhaps the nebulae are sentient entities,” Whitehead speculates (Price 2001, 233–34).⁴ Higher mentalities, however, might also include spiritual or angelic beings associated with realms below the “fine weather of noon day” consciousness. While naturally skeptical, Whitehead (1996, 110–11) insists that his philosophy does not foreclose this possibility, nor the possibility of life after death, provided we are empirically grounded in reliable evidence:

A belief in purely spiritual beings means, on this metaphysical theory, that there are routes of mentality in respect to which associated material routes are negligible, or entirely absent. At the present moment the orthodox belief is that for all men after death there are such routes, and that for all animals after death there are no such routes.

Also at present it is generally held that a purely spiritual being is necessarily immortal. The doctrine here developed gives no warrant for such a belief. It is entirely neutral on the question of immortality, or on the existence of purely spiritual beings other than God. There is no reason why such a question should not be decided on more special evidence, religious or otherwise, provided that it is trustworthy.

Process philosophers and theologians are among those who have held that the evidence from near-death experience is in fact very compelling (Griffin 1997, 2022; Buchanan and Aanstoos 2020). Provided this is truly the case, a commitment to radical empiricism requires not that we explain this data away but that we expand our worldview to include it. Naturally, we must be careful about the evidence we consult in this regard. We should always be wary of so-called “trustworthy” evidence coming from untrustworthy personalities. However, even if eighty or ninety percent of such evidence is untrustworthy, this does not mean we can dismiss the ten or twenty percent that is. Here we should recall

James's oft-repeated claim that only one white crow is sufficient to demonstrate that not all crows are black. As Griffin (1997) has argued at length with respect to "evidence of the paranormal," there are in fact "white crows abounding."

Psychedelic Experience

Whitehead's wilder doctrine of non-sensory perception has also been an important part of the so-called "psychedelic renaissance." Indeed, many philosophical frameworks are being explored with respect to this renaissance, and many disciplines are involved, from the philosophy of mind to psychology, neuroscience, medicine, counseling/therapy, and legal thought. Drawing on Whitehead, process philosophers continue to be key players in the discussion. Peter Sjöstedt-Hughes, for example, perhaps the world's foremost philosopher of psychedelics, boasts the wild(er)ness of Whitehead's doctrine of non-sensory perception as a means of theoretically approaching what is occurring during psychedelic experience.

Whitehead already allows for [amplification] via perception in the mode of causal efficacy. As this perception is mostly suppressed by our higher form of perception (presentational immediacy) via standard brain functioning, the physical psychedelic breakdown of that functioning will allow the emancipation of those causally efficacious perceptions. Of course, the feeling of these subordinate entities will be foreign in their amplification, perhaps explaining in part the ineffability William James stakes as criterion for the mystical state. Naturally, the type of psychedelic chemical and the dose will greatly affect the level of cerebral breakdown. (Sjöstedt-Hughes 2021, 108)

I indicated earlier that wider awareness of the sheer cosmic impress upon us would be akin to a psychedelic experience. Sjöstedt-Hughes suggests not only that psychedelic substances facilitate and amplify this awareness but, more importantly, that they do so through the inhibition of normal brain functioning. What this suggests about the function of the brain in relation to the mind and exceptional experiences is far from insignificant. Our final step is to connect this discussion to recent neuroscience, particularly that of McGilchrist and the mind–brain problem.

Neuroscience and the Mind–Brain Relation: Connection and Praxis

McGilchrist's (2021) recent expansion of his hemisphere hypothesis is a remarkable boon for both scientific and philosophical thought. His contributions are vast, and his aim to advance philosophical discourse by drawing attention to the manifest trustworthiness of the right hemisphere, and the expanded worldview (*weltanschauung*) it supports, is succeeding. "But if we (a) know which

hemisphere is more trustworthy, and (b) can recognise the lexical signature, the ‘fingerprints’, of either hemisphere, we are already at an advantage. If I am right, this is a genuine advance in philosophy,” he states (McGilchrist 2021, 47).

Indeed, McGilchrist has argued that the left and right hemispheres of the brain have fundamentally different ways of attending to the world. This is not based in the (largely) false left/right brain dichotomies prevalent in the pop psychology and self-help literature of the 1970s and 1980s. Rather, it is based in his and others extensive scientific documentation of the kinds of orientations these hemispheres reveal based upon injuries sustained to a respective hemisphere. Consider Table 4, which captures the general orientations of the left and right hemispheres according to McGilchrist.

Left hemisphere	Right hemisphere
Narrow, focused, goal-directed attention	Broad, sustained, vigilant attention
Apprehends parts abstracted from the whole	Apprehends wholes in living context
Operates through representations, maps, and models	Engages the world in direct, present encounter
Fixes and stabilizes what is fluid and temporal	Holds open what is dynamic and emergent
Explicit, analytic, sequential processing	Implicit, integrative, parallel processing
Categorizes, defines, and abstracts	Understands through metaphor, embodiment, and relationship
Instrumental stance: grasps, controls, manipulates	Participatory stance: encounters, responds, relates
Prefers clarity, precision, and predictability	Open to novelty, ambiguity, and uncertainty
Seeks certainty and reduction of ambiguity	Sustains ambiguity without premature closure
Indispensable for precision and execution	Grounds meaning, value, and orientation

Table 4: A comparative expression of the different modes of attending to world belonging to the left and right brain hemispheres.

McGilchrist stresses that although both the left and the right hemisphere are always interacting in normal human experience, there is a fundamental asymmetry between them in that the right hemisphere is overwhelming more reliable as a guide toward reality. At the heart of his thought is the warning that when these respective orientations are not understood in their proper asymmetrical proportion, with the right hemisphere as “the Master” and the left hemisphere as the “Emissary,” civilization is showing signs of decay (McGilchrist 2009). For example, the mechanistic metaphysics of reductive materialism that undergirds modern Western civilization is precisely the kind fragmentary, atomistic, and purposeless vision the left hemisphere grasps, but it is only an abstraction from the wholistic, relational, and value-laden gestalt of the right. For McGilchrist, therefore, pointing out the many ways in which our current disciplines are

captured by the left hemisphere, and pleading for our interdisciplinary recovery of the right, is not merely a matter of truth but also a matter of avoiding societal collapse.

Remarkably, hemispheric duality extends back millions of years into mammalian history. But why does it arise? Why is the brain divided? McGilchrist's (2021, 20–21) answer points to an evolutionary necessity of balancing two fundamentally different ways of attending to the world:

Every animal, in order to survive, has to solve a conundrum: how to eat without being eaten . . . the need to sustain two incompatible 'takes' on the world simultaneously explains, I believe (and there is no significant competing theory), the extraordinary fact that the brain is so deeply divided . . . since the two halves have different roles, it makes sense that they are not mirror images of one another. Every single creature's nervous system that we have studied is asymmetrical in nature, and where there is an identifiable brain it has this bipartite structure.

No doubt McGilchrist is right in his evolutionary assessment. This discussion, however, must raise the speculative question as to whether a deeper metaphysical theory, as found in Whitehead's dual theory of perception, might itself undergird the emergence of the duality of the brain in terms of the left and right hemispheres. Put differently, is the duality of the brain a physical manifestation of the duality of perception as expressed in Whitehead's theory? While there is little room to develop this inquiry here, McGilchrist's work might be seen as a potentially fruitful neuroscientific elucidation of an as-yet-undetermined meta-theory of hemispheric division.

For example, in arguing that "Whitehead's process philosophy has the potential to serve as an adequate metatheory for today's rapidly expanding field of neuroscience," David E. Roy (2017, 128) has recently demonstrated the strong resonances between the orientations of the left and right hemispheres as describe by McGilchrist's and Whitehead's description of two modes of sensory (presentational immediacy) and non-sensory (causal efficacy) perception. "[T] here is indeed a high degree of correlation between Whitehead's theory of perception (a part of his overall theory) and the differing ways in which the hemispheres in the human brain function," he states (Roy 2017, 149). While differences are also apparent, the correlations are worth further exploration, as Roy (2017, 149) suggests:

I find that the details that make up the complex picture neuroscience has painstakingly created bring [Whitehead's] concepts unexpectedly and delightfully alive. The effect of the two streams being joined together is to provide unparalleled insight into the process that constitutes our fundamental nature.

As this information is shared within neuroscience, my hope is that there are those in that field who will come to recognize the capacity of Whitehead's process philosophy to provide an illuminating and heuristic metatheory for this field of science that is becoming central to much in psychology and beyond.

To be sure, McGilchrist (2021, chap. 28) has recognized the capacity of Whitehead's philosophy to inform much in his expansive hemispheric worldview, including his panentheism as consistent with the wisdom of the right hemisphere. Although he is not without critique of Whitehead's theory of perception, as well as Roy's treatment of his hemisphere hypothesis (personal correspondence), a deeper exploration of Whitehead's wilder doctrine of perception might provide metaphysical support for his evolutionary explanation of brain lateralization.

Notwithstanding these possibilities for deeper research, the resonant approaches to the mind–brain problem by McGilchrist and process philosophers must also be emphasized. When it comes to consciousness specifically and its relation to the brain, McGilchrist (2021, 1038) outlines three approaches characteristic of current debates:

1. **Emission:** The brain emits consciousness like a steam engine emits smoke.
2. **Transmission:** The brain transmits conscious like a radio signal tuning into a specific frequency.
3. **Permission:** The brain permits consciousness though a filtering or limiting function.

That the brain simply emits consciousness like a steam engine emits smoke is the standard materialist reduction roundly critiqued by both McGilchrist and process philosophers. By contrast, they tend to argue for either transmission or permission, with different nuances at play. For example, note the different ways McGilchrist, Griffin, and Buchanan converge and diverge in their suggestions with respect to the question.

I suggest that the function of the brain is to create by means of permission, in other words by acting as a kind of filter. This includes the idea of transmission but adds a further element. Consciousness is sculpted: by saying “no” to something it enables others to stand forward into being, as Michelangelo's hand caused his David to come into being by a process of discarding stone from the formless block and allowing other stone to remain. (McGilchrist 2021, 1085)

I suggest that the function of the brain, with regard to perception, is to give us rather clear and distinct sensory perceptions with sufficient intensity to rise to consciousness, so that we can be conscious of certain dominant aspects

of the physical world around us. A side-effect of this function is that most nonsensory perceptions . . . are blocked out. (Griffin 1997, 143)

[F]rom a Whiteheadian perspective, the technology of the radio may be a more apt metaphor for the psyche than the workings of a computer, given how the body/mind acts as a receiver, amplifier, and transmitter of wave-pulses of feeling-information . . . For process philosophy, the entire past universe can broadly be conceived as the depth unconscious of each new occasion of experience . . . the human body/brain functions as a amplifier for selected “bandwidths” of past feeling, thereby making certain sense-related data a “dominant-channel” for the events of the psyche—complementing the psyche’s default setting to receive feelings from its own past events. (Buchanan 2022, 94, 96)

The data of exceptional experience is hardly irrelevant to the suggestion that the brain transmits or permits consciousnesses. It is noteworthy that some psychedelic studies have suggested that when brain activity reduces, experience or consciousness expands (Carhart-Harris et al. 2012; Kastrup 2014). This evidence of an inverse correlation, provided it is trustworthy, strongly suggests that the function of the brain is to enact definite limitations upon our much wider—and wilder—experiential relatedness to the universe so that something cohesive and manageable is available for consciousness. As suggested earlier, we are not conscious of the whole universe pressing upon us; psychedelic medicines, however, might weaken or render the standard limitations of brain functioning permeable, so that we are in fact more conscious of these ever-present, but usually hidden, relations.

With respect to near-death experience, there are any number of extraordinary testimonies where no conscious experience should be possible (Holden et al. 2009; Kelly et al. 2009). If the brain simply produces (emits) the mind, one would expect that where brain activity is negligible or entirely absent, consciousness ceases. Nevertheless, patients return having experienced something they often express as more real than waking sense perception. Again, this evidence, provided it is trustworthy, strongly suggests a transmitting or permitting function of the brain with respect to conscious experience. Moreover, these avenues of exceptional experience might be seen as instances of what spiritual and religious traditions have pointed to for millennia. In prescribing a whole host of spiritual practices, these traditions are eminently aware of their ability to induce experiences, suggesting—and perhaps confirming—that we are more than simply our brain, and our brain is far less than who or what we are. To conclude, let me gesture a few brief remarks on the nature of spiritual practice in light of Whitehead’s wilder doctrine of non-sensory perception.

Given the foregoing discussion, what is spiritual practice? No doubt this topic merits its own substantive treatment beyond simply this article. For now,

however, we might conclude by suggesting that spiritual practices are deliberate practices that allow us to tune in to deeper channels of the cosmic wild(er)ness we inhabit. They are disciplines that have the effect of rendering more transparent the depths below our waking perception. Put differently still, they are methods by which we intuit and access sacramental realms of guidance, wisdom, and compassion, extending from the panentheistic tangle of divine and worldly things.

There is no one spiritual practice fitted to Whitehead's philosophical vision. To the contrary, process philosophers and theologians have identified many (Griffin 1988, 1990; Kling 2020; Faber 2021; Cobb et al. 2022). In doing so, they have followed Whitehead (1996, 102; 1967a, viii) in holding that there are "various relationships within the real physical and spiritual worlds" and that the "spiritual precedes the material." "Physical wandering is still important," Whitehead (1967a, 207) states, "but greater still is the power of man's spiritual adventures—adventures of thought, adventures of passionate feeling, adventures of aesthetic experience." One can read into this statement Whitehead's own sense of the importance of the spiritual undercurrents of human and cosmic life. The distinction between the physical and the spiritual is yet another expression of the ways in which his universe is dual: "The universe shows us two aspects: on the one side it is physically wasting, on the other side it is spiritually ascending" (Whitehead 1996, 160).

Notes

- ¹ For a detailed discussion in this regard, see Andrew M. Davis (2026, forthcoming).
- ² See, for example, Griffin (2016) and J. Angelo Corlett (2010).
- ³ For different arguments for the evidential force of religious experience, see Davis (1989) and Gellman (2001).
- ⁴ Process philosophers, however, have yet to adequately treat UFO/UAP phenomenon with the resources of Whitehead's dual theory of perception. I plan to address this lacuna in a future article. For the relevance of philosophy to this discussion, refer to James Madden (2023).

Competing Interests

The author declares that they have no competing interests.

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Systemic Health Includes Mental Health: Toward Accepting the Truth of Reality

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Grounded in Gregory Bateson's philosophy, this article explores the link between mental health and the health of the system(s) with which the human species interacts. Integrating ecological, psychological, and macroecological insights, mental health is reframed within the systemic paradigm, honoring the interdependence of mind, society, environment, and reality. Humanity's dominant worldview is a self-reinforcing and self-destructive delusion—insanity; pathological population density and size exemplify both cause and symptom of insanity. Compromised systemic health—abnormality among parts of reality—is a deep dysfunction called Systemic Abnormality Disorder. Only a paradigm shift to systemic thinking can alleviate the self-destructive mode of human participation in reality, fostering both psychological and ecological healing. Such a shift expands democracy to include the voices and participation of all species (not just humans) and achieves an integrated worldview consistent with reality. All beliefs are taken into account. Systemic thinking is essential for the health of the planet and its components—particularly the continued survival of the human species.



Physical degradation of the natural world is also the degradation of the interior world of the human.

— Thomas Berry, *The Great Work*

Introduction

In 1946, Albert Einstein asserted: “A new type of thinking is essential if mankind is to survive.”¹ Decades later, Philip Garnett (2018) indicates that “[o]ur thinking is not systemic.” This is a view shared by William Rees, who says: “[W]e don’t think systemically.”² Although systemic thinking traces its roots to numerous philosophers and theologians, it was Gregory Bateson who highlighted its significance and distinctiveness. He recognized it as “something else again” (Bateson 1972), underscoring it as a paradigm. In this context, Rees (2006) is unequivocal: “In short, we need a genuine paradigm shift.”

Through the systemic paradigm, natural integration is understood to account for all of reality—that from which nothing is excluded (Fowler 2009, 2021). Systemic health is the health and wellbeing of all things—the normal existence of all things in the “global system-of-systems” (Garnett 2018). Systemic health includes the degree to which any and all things are free from the influence of pathological³ abnormality by any part (or any combination⁴ of parts) of reality. Thus, by definition, this includes the complete and infinite set of interconnected parts of reality as well as all of their relationships (Berry 2009a, 2009b; Fowler 2009, 2021; Fowler et al. 2013; Fowler et al. 2024)—nothing is excluded.

Given this holism, why is the systemic paradigm, or worldview, not the predominant belief system today? The answer is multifaceted; a constellation of factors shapes our thinking. This article explores mental health and the degree to which belief systems conform to, or are divorced from, objective reality and its inherent truth (veracity; Fowler 2021). To frame this exploration, the term “insanity” is used, borrowing from a definition found in the practice of law: “[M]ental illness of such a severe nature that a person cannot distinguish fantasy from reality.”⁵ In the context of this article, the term applies broadly, encompassing a range of delusions, from simple involuntary cognitive misperceptions to willful and conscious denial of objective truth (e.g., outright intentional lying—with pathological lying as an extreme). Such delusions involve not only individuals but contemporary society as a whole.

A central element of systemic thinking is recognition that all things (all parts of reality, including reality as a whole) are interconnected (Bateson 1972; Berry 2009a; Fowler 2009, 2021; Fowler et al. 2024, Garnett 2018)—the unity of reality. This interconnectedness ensures that psychological wellbeing, cognitive functioning, and the health of the environment are, to varying degrees and in various ways, interlinked—some very profoundly. Environmental conditions influence both the mental health and thinking of today’s society. Thinking, in

turn, influences behavior, which clearly impacts the natural systems in which we participate (Merz et al. 2023). These relationships have been recognized for decades and are a central focus of ecopsychology, a field formally named in 1963 (Schroll 2003). Since its inception, ecopsychology has generated a substantial body of scholarly work documenting the existence and nature of these connections. Authors Theodore Roszak, Mary E. Gomes, and Allen D. Kanner (1995), in their book *Ecopsychology: Restoring the Earth, Healing the Mind*, highlight the reciprocity in the relationship between mental health and systemic health (particularly ecological health).

The detailed nature of the relationships between our mental health, our cognitive function, and the health of the environment is extremely complex. The mental health we attain from exposure to healthy natural environments can be viewed as a service provided by such systems (Bratman et al. 2019). This is obvious in the diversity of topics treated in books, journal articles, and other publications regarding the importance and meaning of what people experience in the context of their surroundings. The benefits of exposure to pristine natural systems are widely recognized by organizations like Outward Bound International, a global network founded in 1941. Wilderness therapy programs, forest bathing, the beneficial effects of hiking and camping, and taking vacations in national parks are all based on a broad recognition of the benefits of time spent immersed in natural environments suffering minimal human influence. The Wilderness Guides Council is an organization of individuals dedicated to facilitating such experiences, aiding people through their life's journey and its mental, psychological, and cognitive challenges.

Such challenges are not trivial, nor are they rare in today's world. There are patterns in the occurrence of mental illness that substantiate the conclusion that healthy wilderness has a beneficial effect on our psyches. For example, Ryan Hammoud et al. (2024) not only show a correlation between mental wellbeing and the diversity of the environment (range of natural features such as trees, plants, and birdlife) in which people find themselves but also provide numerous references to literature making the point that people living in cities experience a higher incidence of mental illness compared to people living in rural environments. A systematic review of related literature (Tran et al. 2022) shows how what is called greenspace exposure is involved in this pattern—the pattern in which the “degradation of the natural world” leads to the “degradation of the interior world of the human” (Berry 1999).

Unhealthy natural environments can harm not only psychological wellbeing but also cognitive function (e.g., Sariaslan et al. 2015; Delgado-Saborit et al. 2021; Jimenez et al. 2021; Zhao et al. 2021). While psychological distress itself can affect cognition, degraded natural systems—driven by the pathological influence of human activity on ecosystems, the biosphere, and the full Earth system—also have direct cognitive impacts. These include increased risks of

dementia, Alzheimer's disease, memory loss, and attention deficits and reduced executive function—some within hours of exposure to natural systems degraded by human activity (e.g., breathing air contaminated with particulate matter; Faherty et al. 2025).

As Myriam V. Thoma et al. (2021) state, “Humankind is confronted with progressing climate change, pollution, environmental degradation, and/or destruction of the air, soil, water, and ecosystems.” They underscore the importance of recognizing and diagnosing the psychological disorders that arise in response to these anthropogenic factors—central concerns of clinical ecopsychology. From a systemic perspective, it is essential to acknowledge not only the pathological influences humans impose on natural systems (including ourselves) but also the factors that sustain and normalize patterns of pathological participation and influence (Fowler 2021; Fowler et al. 2024). Such pathological qualities are exemplified by both the density of the human population and reduced diversity caused by abnormally large population numbers. As treated in the next two sections, both have their effects on mental health and cognitive wellbeing.

A First Specific Example: Population Density

André O. Werneck and Danilo R. Silva (2020) use the title “Population Density, Depressive Symptoms, and Suicidal Thoughts” to build on previous work involving “the association between population density and mental health.” They concluded that there is “a negative effect of urbanization on [the] mental health of the population.” Published research involving the complexity of this association often contains statements such as: “People living in densely populated and socially disorganized areas have higher rates of psychiatric morbidity” (Sariaslan et al. 2015). Systemically, everything is interconnected (Fowler 2021; Fowler et al. 2024), and studies such as that of Marlyaba A. Marzukhi et al. (2023) highlight the negative effects of population density on mental health.

Given that population density, in various ways and to varying degrees, is a contributing factor to the state of our psychiatric health and thinking, it is important that we acknowledge the extremely abnormal or pathological nature of this dimension of the human species. This is shown in Figure 1, where the human species has extremely abnormal population density compared to the density of forty-seven nonhuman species (both in log scale to enable working with a normal distribution, or bell curve; see Limpert et al. 2001). In this figure, the comparison is shown for the density of humans measured in numerous groups of countries (each a group of ninety-seven countries). Such groups are known as combinations⁴ and, in this case, could have ranged in size from one to 195. The choice of a group size of ninety-seven resulted in a total of

2.86×10^{57} distinct combinations, making it necessary to subsample them for display; a random sample of 1,000 was used.

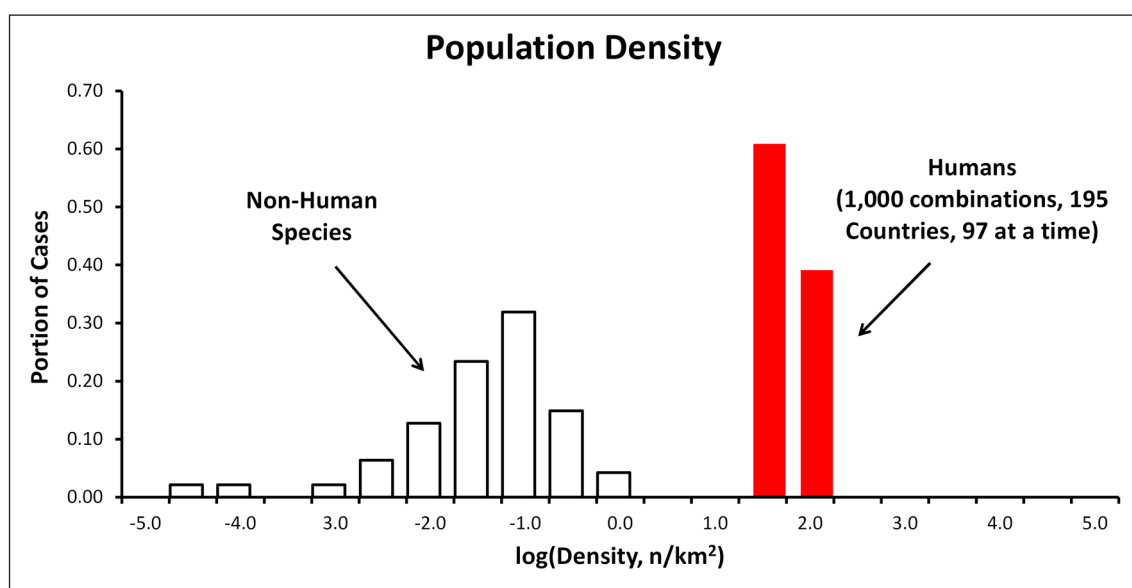


Figure 1: The abnormality of population density for the human species in comparison to that of forty-seven species of nonhuman mammals with body sizes similar to that of humans. The density for nonhuman species is measured as global population size divided by geographic range size for each species (Fowler et al. 2024). The data for humans is density measured for a random sample of 1,000 combinations⁴ of ninety-seven countries around the world. The raw data for individual countries is based on information provided by the CIA for 2019.⁶

The data displayed in Figure 1 apply to 2019. The abnormality observed today is undoubtedly more extreme because of increases in the human population combined with decreases in the populations of many of the nonhuman species. In any case, a normal population density would not pose the threat of compromised mental health that is observed today. To be normal, the average density for humans would be similar to that of Kennedy County, Texas, with approximately 350 people currently living in an area of 3,778 square kilometers. Recent global density (8.5 billion spread over the terrestrial surface of the Earth, excluding Antarctica) is well over 500-fold larger (about sixty-three per km² or 1.8 in log scale). The pathological density of the human species has multiple consequences, including compromised mental health.

Given information indicating that living in urban areas can be detrimental to mental health (particularly involving insanity; Torrey and Bowler 1990), it is also worth noting the abnormality of density in cities. Figure 2 shows the

pathological nature of human density in 3,501 cities in the United States. As can be seen, urban density is about ten times (one order of magnitude) more abnormal than density among groups of countries (Figure 1). The prevalence of mental illness in today's society cannot be disassociated from the pervasive abnormality in population density as shown in Figures 1 and 2.

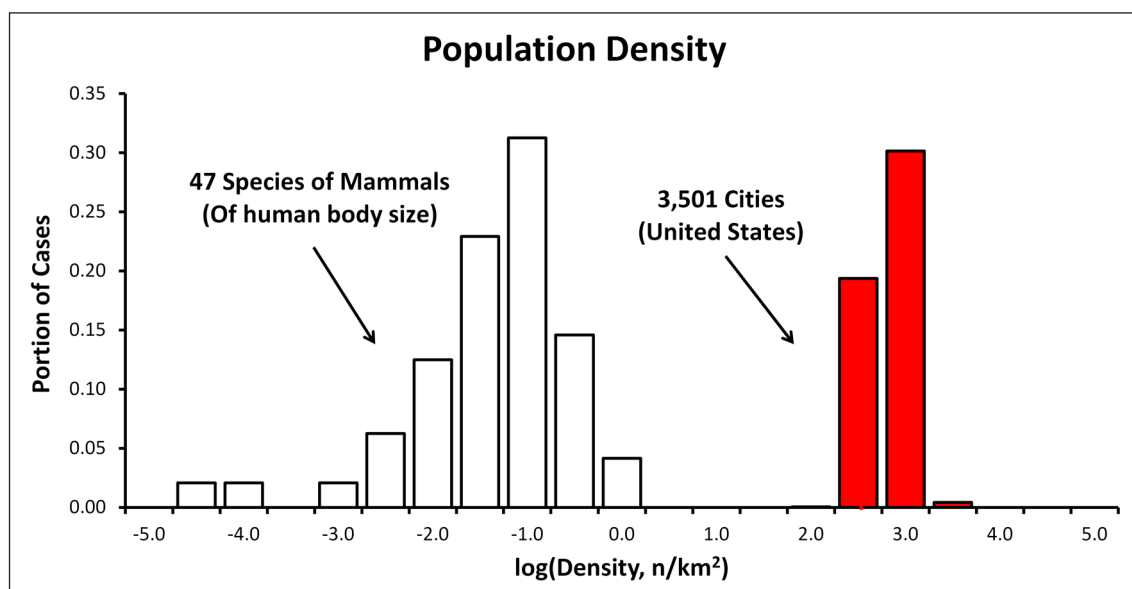


Figure 2: The pathological abnormality of the population density of the human species in cities of the United States.⁷ The data for the density of nonhuman species are the same as for Figure 1.

Systemic thinking, by definition, is not confined to the single concern of population density—there are other forms of pathology, as brought out in the next section, which deals with the pathological size of the total human population and resulting lack of diversity.

A Second Specific Example: Reduced Diversity

As mentioned, Hammoud et al. (2024) focus on a correlation between mental wellbeing and the diversity of natural elements in the environment. Thus, in parallel with dealing with population density, it is useful to observe the abnormality (or pathological quality) of metrics involving diversity insofar as such metrics involve humans. This is shown graphically in Figure 3, where the diversity corresponding to the pathologically large current global human population is nearly zero (for details regarding the diversity metric, see Fowler 2008). Thus, the diversity among this combination of forty-eight species is essentially destroyed by the overwhelming number of humans (the “monoculture” of humans globally). The current global human population size is more than 1,000 times larger than what it would be to maximize diversity. Systemic health is lacking; the biosphere and all of its parts are impacted by

the pathologically large human population and associated absence of diversity. Total population is a species-level metric that is obviously closely related to population density (Figure 1).

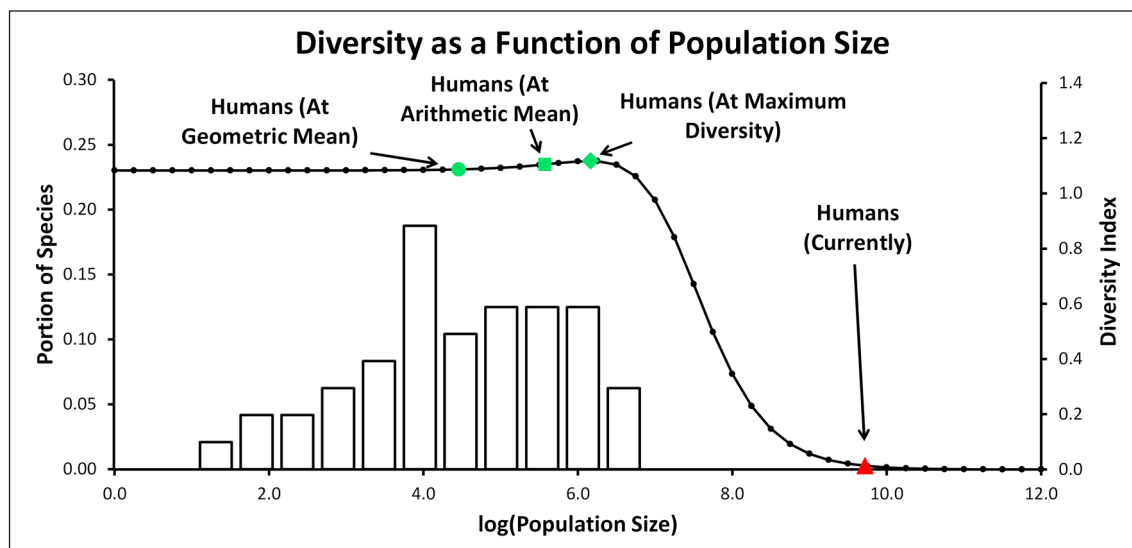


Figure 3: The pathological abnormality of the global human population and resulting diversity for a set of 48 species (including humans). The curved line illustrates the diversity among the species in the sample as dependent on varying global numbers for humans. The data for the global populations of the non-human species involve the same species represented in Figure 1.

The graphs shown in Fowler (2008) illustrate diversity that has been impacted by various species-level characteristics. For example, production of CO_2 by humans is over 5,000-fold larger than what would maximize diversity—an abnormality with a magnitude very similar to the case for total energy consumption. Water consumption by humans is hundreds of thousands of times greater than what would maximize diversity! For biomass consumption, such multipliers vary from seven to over sixty depending on the ecosystem, species, or group of species from which biomass is taken. Charles Fowler et al. (2013) find that current harvest rates in commercial fisheries are, on average, over twenty-fold too large to maximize biodiversity. Clearly, these examples of compromised diversity are of human origin and impact individual species, combinations of species, ecosystems, and the biosphere—a form of compromised systemic health insofar as everything is involved. Based on work such as that of Hammoud et al. (2024), this includes compromised mental health. Reducing the human population would accomplish the goal of increasing diversity for this dimension of being a species everywhere. In part, this would involve increases in the sizes of the populations of many or most of the nonhuman species. One benefit expected for humans from such a reduction would be reduced insanity.

Responses to the simple recognition of the multiple ways in which humans are a pathogen highlight a key difference between conventional and systemic thinking. Conventional thinking tends to generate support for reducing density or population size based on perceived personal benefits—an attitude of: “If it helps me, I’m in favor of it.” Conversely, a business leader thinking conventionally would oppose such reduction with the understanding that it would reduce their profits—an attitude of: “If it hurts me, I oppose it.” Insanity predominates in both cases. The insanity involves a confining focus, a focus that denies the vast majority of the other connections, ramifications, and consequences. This is plainly obvious when economic factors are emphasized to the exclusion or denial of ecological matters (Daly 1996; Costanza et al. 1997). Systemic thinking, by contrast, emphasizes maintaining human participation in reality within the bounds of normal variation to have a normal impact on all things and accept all consequences—both the full set of repercussions that are considered good and those considered bad in conventional thinking. This broader, holistic perspective extends concern beyond the individual or even humanity, encompassing all of reality—(that from which nothing is excluded) every person, every species, and the countless combinations and interconnections among them. Everything would be freed from the injustice of pathological influence—whether by any individual human or by the human species (Fowler 2021). Everything, all parts of reality, would be granted freedom from such influence. Everything would be granted the right to be safe from the onslaught of pathological influence by the human species—progress toward systemic health to include such safety for the human species itself (Garnett 2018).

The Complexity of Human Impact

Population density and size are just two of many factors with measurable pathological qualities involving human impact on all natural systems—including all human systems. Other key factors include pathological levels of CO₂ emission, pollution, light production, water use, agriculture, industrial activity, sound production, resource and energy consumption, mining, chemical production, technology, and geographic range size (Fowler 2008, 2009, 2021; Thoma et al. 2021). As a species, we are a pathogen, as brought out by authors like James Lovelock (1991). The complexity and combinations⁴ of the numerous pathological qualities and consequences of our species’ existence make up what is often referred to as a polycrisis (the multiplicity of problems facing, and caused by, the human species; Liu and Renn 2025). These all contribute to, or result in, a lack of systemic health, with particular repercussions for ourselves—specifically, compromised mental health.

Thus, adjusting our population density and size to be normal would only be a minuscule isolated step toward becoming a normal, nonpathogenic species—crucially essential but dangerously incomplete. Alone, achieving a

normal population density or size would be extremely insufficient—fatally partial and another example of insanity. Confined to either or both, achieving normalcy would involve omission; it would be unrealistically partial in ignoring so many other (especially technological) human impacts on the environment and ourselves. Kurt Gödel would recognize any such progress as incomplete. For example, to fully address the impacts we have on ourselves, we would need to deal directly with (not just mitigate) the production of plastics and the risk of dementia resulting from the accumulation of microplastics in our brains (see Nihart et al. 2025). The impacts of microplastics and other artificial biochemicals on other biota remain almost completely unknown. The list of ways we are having a pathological influence on all beings (including ourselves) is vast (Fowler 2008, 2009). Achieving systemic health is a major undertaking!

Given clear appreciation of at least a few of the consequences of our actions, why do we continue to maintain the status quo? What stands in the way of becoming a normal species to relieve all beings (including ecosystems, the Earth, and humans) of the consequences of our pathological nature—to do what we can to achieve systemic health? Is the collective delusion, or insanity, that prevents such progress self-perpetuating?

Insanity Perpetuates Insanity

Bateson (1979) highlights the imperative of unity between mind and nature. Our belief systems must match, or be isomorphic, harmonious, and congruent with reality⁸; this consistency or coherence is essential, by definition, to avoid insanity. One of the well-recognized patterns in nature is that systems are self-perpetuating, self-organizing, and self-maintaining (they exhibit homeostasis; Fowler 2009).⁹ Our belief systems are no exception (Fowler 2021). The mismatch between conventional thinking and reality is a form of insanity that persists—a long-recognized disconnect (e.g., Dunning-Kruger effects, confirmation bias, ostrich effects, halo effects, blind spots, Rashomon effects, cognitive dissonance, and a variety of well-known biases). Artificial intelligence (AI) aspires to mimic human thinking and consequently produces what AI itself recognizes as hallucinations—a form of mechanized insanity. AI cannot holistically take itself into account without fully embracing systemic thinking.

The insanity of conventional thinking is systematic and self-reinforcing. The vicious feedback loop begins with a devastated environment (systemic malady) that impacts our mental faculties, psychological health, and cognition with related thinking and behavior. The insanity of our thinking stays its course and fails to resolve the pathological impact our species has on the natural environment—prolonging the unhealthy qualities of the natural systems in which humans are embedded and with which we interact. The resulting impaired systemic health reinforces the insanity that began the cycle. This cycle is endlessly repeated, unabated, to exaggerate insanity. Such insanity is exemplified by the concept of

sustainable development, which, through systemic thinking, is recognized as a perfect example of an oxymoron (Brown 2015). AI used to promote sustainable development adds to the feedback loop reinforcing insanity.

Breaking the Cycle: Spiritual Experiences

Successful treatment of any mental illness needs to include substantive change. Mitigation treats symptoms but does not change the underlying thinking (Fowler et al. 2024). To break the vicious cycle of insanity perpetuating itself, individuals can contribute by recognizing themselves as infinitely complex and integral parts of reality. This might be considered the rational part of therapy. Developing a felt sense of this reality takes it to a whole different level, as treated by Abraham H. Maslow (1993) and Keith Happawana (2026) in consideration of peak experiences, self-transcendence, or awakening—all elements of humanistic psychology and the realization of unity and meaning (or wisdom). The related epiphanies involve insight, revelation, and enlightenment of stunning proportions—“a ha” moments that are life changing, intensely spiritual, and deeply transformational (experiencing ineffable awe).¹⁰ Collectively, such experiences contribute to a shift in paradigm in which holism is intimately embraced, understood, and assimilated.

However, healing at the individual level need not be confined to short-term or momentary change; it can involve longer-term transition (arguably often unnecessary if living a full life under normal circumstances—full systemic health). Shared stories that illustrate shifts over significant time frames can be very effective in collective change. These include the impact of other species as experienced, over a period of years, in their natural surroundings, as exemplified by “The Healing Woods” (Reben 1952)—a story that includes physical as well as psychological healing that opens “a new way of life.” Other stories involve individuals spending extensive time with wildlife, such as Jane Goodall’s (2000) experience with chimpanzees “to become one with the spirit power of life itself.” The stories from Indigenous people living close to nature provide further examples. Were we all living in such a manner (in other words, if there were full systemic health), there would be little concern about mental health.

Deep gnosis and illumination are involved in a thorough grasp of systemic health. Change to achieve such health, and specifically a shift to the systemic paradigm, obviously includes a change of mind—something that, for some, may include the use of psychoactive substances (Pollan 2018) insofar as these materials contribute to spiritual experiences resulting in transformational change. The grasping of reality (the truth of reality) often involves spiritual experience—an incomparable transition toward unprecedented mental health. It is a deeply and intensely spiritual experience to perceive everyone and everything holistically, as infinitely complex products of, and having influence on, an infinite set of factors—being universe-referent parts of reality (Berry 2009b).

It involves a realization that there is meaning to being—inherent wisdom. Such progress at the individual level allows for projection and understanding that the same principles hold for species, ecosystems, and the biosphere (embracing the fractal nature of reality; Fowler 2009, 2021). Based on this systemic perspective, our collective path forward requires intentionally building normal relationships with all systems—a process of mutual enhancement (Berry 1999) that mirrors what is also essential for each individual. Globally, a shift to this paradigm could involve a form of cultural evolution that is more rapid than genetic evolution (Fowler 2021; Waring and Wood 2025) but includes both.

Discussion

Throughout history, paradigm shifts (Kuhn 1962) have brought human beliefs into closer alignment with objective, observable reality. The more closely our beliefs match the truth of reality, the less we experience insanity—by definition. Over history, there have been a number of paradigm shifts. For example, scientific observations gradually convinced most people that the Earth is essentially spherical, and later, that it orbits the sun. The reality of plate tectonics required extensive scientific effort before it became widely accepted. Over time, genetic code also came to be recognized as fundamental in determining the nature of individuals and species. A common thread in such shifts is the importance of careful observation—of truly seeing aspects of reality, mostly through the scientific lens.

As explained in Fowler (2009, 2021), embracing the true nature of reality lies at the heart of the systemic paradigm (Bateson 1979). The shift to this paradigm is imperative. Without this shift, we, as a species, will fail to adequately deal with the risk of self-imposed extinction caused by the pathological nature of our own species (i.e., the risk of extinction posed to all species, including humans). In addition, we will fail to protect all ecosystems from anthropogenic pathological influence by our species; in other words, we fail to make progress toward achieving systemic health and associated mental health. Succeeding in the shift, the human species moves to protect all things, including itself, from all consequences of an abnormal existence—part of the holism of the paradigm. Systemic health will emerge.

The shift to this paradigm involves the convergence of science and religion, as seen in past such shifts; in fact, it involves a merger of all belief systems¹¹—all religions achieve being “on the same page.” Reality, in its entirety, is composed of interconnected parts whose relationships with each other defy human comprehension, yet they are what they are; the statement that “it is what it is” may be the most succinct representation of the systemic view of reality (Fowler 2009). A key insight is that each part reflects the infinite (the “radiance” spoken of by Joseph Campbell [1988]) in both its origin and existence (Fowler et al. 2013)—everything we observe is part of this whole (Fowler et al. 2024). These

truths, however, are dangerously absent from the prevailing mindset in today's world. Notably, our own thinking—particularly the way it brings us to engage with reality—is rarely acknowledged as a systemic element of reality. Almost completely absent from conventional thinking is the full set of consequences of this thinking on all parts of reality—and particularly, as emphasized in this article, on thinking itself. Systemic health is essentially ignored.

This disconnect from reality is insanity and, as previously discussed, involves a self-perpetuating system of thinking in which humans accept (even promote) operating outside the bounds of normal natural variation. However, when we fully embrace reality, we recognize that each entity exemplifies how to be itself—all things considered (Fowler 2021; Fowler et al. 2013). Electrons in the hydrogen atoms of the Earth's mantle show us how to be electrons in the hydrogen atoms of the Earth's mantle, mushrooms in a forest show how to be mushrooms in a forest, planets in solar systems show how to be planets in solar systems, and black holes in galaxies show how to be black holes in galaxies. Likewise, mammalian species of human body size in the Sahara Desert demonstrate how to exist as such species in this desert. For every category of being, there is a pattern. Like the patterns of body temperature for individuals (Fowler 2021), such patterns are informative about what works—all things considered, everything taken into account. In other words, there is holistic meaning in everything; the interconnected web of all existence is a web of meaning (Lent 2021)—the wisdom of reality.

This perspective brings an important realization. Like Thomas Berry (2006, 2009a), Bateson (1979), and others (Hobbs and Fowler 2008), various luminaries over the millennia have recognized that other species provide guidance for how to be a species. Other species of mammals of our body size serve as role models, demonstrating how humans can remain systemically viable as a species (Fowler 2009; Fowler et al. 2024). Imitating these natural role models offers a straightforward path out of the insanity that currently prevents/opposes systemic constraints on our species. If we were a species having normal impacts on all things, insanity (both a cause and a consequence of our abnormality) would not be the issue it is today. Huge strides would be made in achieving systemic health—reducing abnormality, not only for our own species but for all systems with which our species interacts and within which it participates.

The insanity of the prevailing perspective today can be given the name Systemic Abnormality Disorder (SAD—not to be confused with Seasonal Affective Disorder). SAD is not listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR). Richard Louv (2005) coined the term Nature-Deficit Disorder to point to the impact of insufficient contact with normal, healthy natural environments on children. SAD is the more generic and global problem being treated in this article. Systems from the biosphere to local ecosystems (with all the species that inhabit them), and all the individuals involved, are

unhealthy, owing to pathological human influence; there is a major lack of systemic health. These maladies are contributing to our collective insanity—a form of psychological and cognitive disorder. Restoring those systems to health through systemically normal participation by humans is a way to heal the mind (Roszak et al. 1995) and promote systemic thinking. This is a means of allowing the brain to function relatively free of the distractions caused by the intensity of abnormal human enterprise and, thus, facilitate systemic thinking.

What does the systemic paradigm have to do with truth? A central connection lies in the fact that insanity reflects a disregard for, or ignorance of, the truth of reality. This can range from deliberate, voluntary, pathological lying to innocent ignorance of the facts, with lying by omission often involving elements of both. Overcoming this form of insanity is essential. For many, making a sincere and responsible effort to tell the truth would represent a profound shift. Resistance to doing so is part of the insanity being treated here. The systemic paradigm is based on reality—that from which nothing is excluded (Fowler 2021); reality includes all modes of thinking. The health of all systems (systemic health) is included. Adopting the systemic paradigm would include embracing wisdom holistically—the wisdom of reality, as advocated repeatedly in the literature (e.g., Fazey et al. 2020). Because AI cannot account for itself and all its consequences, artificial wisdom is impossible. This is the point made by Bateson (1972) when arguing that television sets fall far short in representing themselves.

Thus, a huge step toward truth lies in recognizing the infinite veracity of reality as it is reflected in what we observe (Fowler 2009, 2021; Fowler et al. 2024).¹² The truth inherent in all things is ineffable but real. It is expressed both in Campbell's (1988) "radiance" and Berry's (2009b) "voice" of all beings—truths that scientists can also discern, particularly by observing other species. As Berry (1999) urges, we must "listen to the voices of other species." Even something as simple as learning what constitutes a normal population density (Figure 1) would be a small but significant beginning—learning from other species as they represent (embody) the basic and complete truth of their origins, being, and meaning. The infinite nature of the universe is taken into account—including our thinking and every butterfly effect¹³ over all time and space. Everything embodies the truth of its origins and existence—a truth recognized in Taoism and Buddhism as well as by philosophers such as Aristotle, Baruch Spinoza, Georg Wilhelm Friedrich Hegel, Berry, and Bateson. All contextual and intrinsic factors are taken into account in proportion to their actual importance (their true importance)—thus obviating any problems caused by innate tendencies to legitimize one over the other (Horne et al. 2025).

As is clear, there is nothing trivial about the holistic quality of the truth/veracity (Fowler 2009, 2021) of reality. This is seen in its transdisciplinary nature—the way reality is made up of all the subjects of all disciplines. As such, reality is a union of the "deep" of "deep ecology" with the "deep"

of the plethora of other subjects (e.g, history, systems science, geology, mathematics, astronomy, cybernetics, information theory, humanistic psychology, epistemology, ecopsychology, chemistry, physics—ad infinitum). Deep philosophy and deep theology mean that all belief systems are included and that, in a shift to the systemic paradigm, the relevant practitioners all embrace systemic thinking. Such a shift involves knowing that the subjects of all disciplines are all real parts of reality, with each part being what it truly is—always beyond comprehension in any form of thinking or discipline but always accounted for in what we observe.

A typical conventional argument is exemplified by the following assertion: “Stoicism, being very similar to systemic thinking, supports shifting to the systemic paradigm.” However, in systemic thinking, this is recognized as conventional thinking, and that what stoicism treats is already taken into account by the holistic nature of reality. This holism includes the subjects of all disciplines yet to emerge along with the unknowable that will never become the subject of a discipline. The holism of natural integration (Fowler 2009, 2021; Fowler et al. 2013; Fowler et al. 2024) excludes nothing. Teams of interdisciplinary experts are replaced by the observation of reality—guidance provided by the infinite nature of reality (Berry 1999, 2009b; Fowler et al. 2013). Self-proclaimed experts are confined to those with a commitment to finding and revealing observable normative information—holistic information deeply coherent, or consonant, with the action or mode of being under consideration; there is a strict match between information and action (Fowler 2009, 2021; Fowler and Hobbs 2009).

Part, if not all, of Berry’s (1999) *The Great Work* is the matter of becoming a normal species. Should we become a normal species, everything would be freed of abnormal human impact. This would be a major step toward systemic health in relieving all things of the injustice of pathological human impact. Granting such freedom would become policy codified in legislation to account for all the laws of nature. If humanity were to become normal in every dimension of what it means to be a species—reality (that from which nothing is excluded—not even God, whatever God actually or truly is) would be freed from the injustice of our current pathological influence (Fowler 2021). This transformation would also free humans from the psychological harm brought on by unhealthy environments caused by current pathological human influence—influence that is often justified, in conventional thinking, as being in the best interests of humans, human institutions, and human enterprises. These justifications exemplify what Bateson (1972, 1979) refers to as “conscious purpose”—ignoring the bulk of reality. It is the insanity of conventional thinking that needs to be surmounted by shifting to the paradigm of systemic thinking.

Part of this shift involves expanding—rather than abolishing—democracy (Fowler 2021; Fowler et al. 2024) so that the voices of other species (Berry 1999) are heard.¹⁴ Diversity, equity, and inclusion apply to all things. As illustrated in

Figure 3, diversity can be maximized by normal participation in reality (Fowler 2008). Equity is inherent to the fact that all things emerge from reality (Morowitz 2002). Further equity is seen in all things being afforded equal rights to be free of pathological human impact—direct or indirect. Inclusion follows from the truth that reality excludes nothing (Fowler 2009, 2021). These principles can be seen as self-evident truths and, when deeply understood and fully embraced, address much of the insanity present in today's world.

The bulk of this article has examined the effects of human abnormality on our minds through the anthropogenic degradation of all systems, including ecosystems and the biosphere. It is important to emphasize that the insanity of conventional thinking is not the only explanatory factor behind the origins of the pathological role of humans in the Earth's systems. These origins, like those of anything we observe, involve a constellation of factors. One of note is the process of evolution; evolution gave rise to both our brains (and the way we think) and the way we are as a species. In this context, it is well known that genes serve to promote their being passed on to future generations, sometimes leading to the process called “evolution to extinction,” “evolutionary suicide,” or “self-extinction” (Parvinen 2005; Parvinen and Dieckmann 2013; Lansing et al. 2021). This exemplifies the general principle that what is good for a part can be detrimental to the whole (and vice versa; Fowler 2021).

Some of our more direct pathological effects are exemplified by technologies—things totally absent in the existence of any other mammalian species. Consider AI; to our knowledge, no other species has developed this technology, making it fully abnormal. How does this abnormality shape our thinking, and how are we affected when it enables us to lie more convincingly, commit crime more effectively, or perpetuate insanity more purposely? It is well established that people can become addicted to technologies—particularly screen-based devices—a direct consequence of this kind of abnormality (Kuss and Griffiths 2012). Even agricultural technologies foster, in some way, the delusional belief that we can control nature. This belief reflects a deeper insanity: the failure to recognize that confining ourselves to mitigating action does not alter the underlying thinking that causes the very problems being mitigated (Fowler et al. 2024). Without a change in thinking, without a shift to the systemic paradigm, today's problematic behaviors (Merz et al. 2003) are destined to be repeated.

How can we, as a species, return to a state of normalcy and thereby foster improved mental health and a revival of realistic thinking? Our consumption of some resources—such as harvesting fish from the world's oceans (Fowler et al. 2013) and timber from forests—may be largely within our control. However, collective self-control would be a form of insanity (extreme abnormality); no other species exercises intentional self-control at the species level. Our only realistic option (Fowler 2003) may be relying on the service of the homeostatic

processes of the larger systems in which we participate. All systems have self-correcting, self-organizing, self-maintaining properties⁹ (Fowler 2009) upon which we can rely. As Berry (1999) puts it: “The accomplishment of the Great Work is the task . . . of the universe itself.” Becoming a normal species can be seen as a holistically collaborative effort. This would involve a deep acceptance of reality and fully embracing, even welcoming, the creative aspects of cosmogenesis (Swimme 2022) that result in the structure and function of all systems—including ecosystems and, particularly, the informative patterns among species that guide us. When viewed as assistance or help, what we typically perceive as collapse, disaster, or Armageddon can instead be understood as the pain of healing, the pain or suffering involved in regaining systemic health, much like what we experience on a personal level.¹⁵ We, as humans, both as individuals and as a species, will endure all of what is involved in the healing processes (self-organizing dynamics) of ecosystems and the biosphere.

Words often attributed to Thich Nhat Hanh describe these dynamics well: “We have a natural tendency to want to run away from suffering. But without any suffering, we can’t fully develop as human beings.”¹⁶ Despite the pain involved, the self-organizing and self-maintaining nature of systems can ultimately serve long-term human interests (Fowler 2009, 2021; Fowler et al. 2024)—as well as those of all systems making up reality. By shifting to systemic thinking, we can fully accept these forces and their “disciplinary” role.¹⁷ This acceptance involves the submission of Islam, as laid out in the Qur’ān.¹⁸ With the assistance of nature (the expression of natural law), especially in species-level change, all aspects of reality—including ourselves and our mental wellbeing—will be relieved of the burden of the pathological human impact that has destroyed systemic health. Through homeostasis (the self-organizing forces of nature), improved systemic health will include better mental health, benefiting both humanity and the world at large.

To one degree or another, all humans practice thinking that involves insanity. In the drafting of this article, some of the references were found and parts were edited with the assistance of AI—an extremely abnormal construct for a species and thus an example of insanity. The energy and resources required to produce the data used to show how abnormal humans are as a species added to the related abnormalities—exemplified by CO₂ production and energy consumption (Fowler et al. 2024). The delusion that such things have negligible impacts is a form of insanity. This article expresses a hope that most people will eventually embrace the systemic paradigm—a hope that many, thinking conventionally, will dismiss as delusional. While there may be genuine potential for an asymptotic shift toward such a worldview (Fowler 2021), history suggests that only a portion of humanity is likely to adopt it. Reaching a critical mass of influence could take centuries. However, if homeostatic forces begin to counteract our pathological resistance within the next few decades, this

transformation might unfold more rapidly—with the possibility of avoiding our own extinction.

The signs of widespread irrationality are almost impossible to overlook; they manifest in international conflicts, politics, marital relationships, fisheries, economics at all levels, medicine, forestry, industry, agriculture, advertising—ad infinitum. The feedback perpetuating insanity is incomprehensible. To break free from this situation, we must acknowledge that the universe is made up of interconnected parts—interrelated in the way they are actually interrelated, the absolute truth about the way they are interrelated (Fowler 2009). If we aim to become a truly normal species under existing circumstances, everything shifts. Adopting a systemic way of thinking dramatically changes our perspective (Fowler 2021; Fowler et al. 2024). By enhancing systemic health, we will also enhance mental health. When systemic thinking is integrated into educational systems, the editorial policies of scientific publications, and world religions, it has the potential to take root and thrive.

Conclusions

A significant contributing factor in our failure to think systemically involves the impact on our minds of the anthropogenically degraded state of the natural environment—brought about by our failure to think systemically. When natural systems are unhealthy (when there is a lack of systemic health), patterns of irrationality in our thinking are reinforced. This makes it difficult for individuals and societies to adopt holistic perspectives. We are caught in a cyclical pattern wherein ill systemic health and dysfunctional thinking perpetuate each other. This insanity involves patterns of thought and behavior that are at odds with reality. These self-reinforcing patterns preserve the status quo and can only be altered by a way of thinking that recognizes the interconnectedness of all things and aligns with reality. Achieving the insight to adopt this way of thinking can be an intense spiritual experience—knowing that it applies to all things, including oneself. Conscious effort can be of help, but systemic assistance is paramount; collaborative efforts involving all things are essential.

Scientific observation is a critical tool for breaking free from self-reinforcing insanity. By observing reality objectively, as Bateson and Berry advocate, we can recalibrate our thinking (part of a spiritual experience) and act in harmony with nature. Such a shift is necessary for both personal and collective wellbeing. Observing other mammals offers valuable insights into healthy systemic living. The very being of such species provides holistic models to guide the human species in adopting more balanced participation in the real world, helping us restore our own systems to health and allow all other systems the option of regaining their health—promoting systemic health. Systemically, when our communities, institutions, and environments are functioning well, when systemic

health prevails, individuals are more likely to experience psychological wellbeing with a healthy holistic perspective and embrace the systemic paradigm.

Systemic thinking is vital to human survival. Visionaries like Albert Einstein and Berry recognize the extremely important relationships between various elements of our world as key to addressing complex challenges and ensuring the continued existence of our species. Isolated specific examples involve the relationships between population density/size and mental health. Overcrowding leads to a host of problems, from environmental degradation to mental health issues, demonstrating how systemic failures manifest in real-world consequences. The collective elements of our compromised mental health, and its consequences, make up what can be called Systemic Abnormality Disorder. It is clear that human abnormality is multifaceted, affects many areas of life, and requires a comprehensive paradigm shift.

The shift to the systemic paradigm (the unity of mind and nature; Bateson 1979) means fully committing to objective truth and recognizing the misleading nature of current thinking. Only by acknowledging and correcting our flawed perspectives can we hope to be involved in restoring health to all systems. We must take great care to avoid perpetuating flawed thinking through using AI as automated insanity to further distance us from reality. By learning from nature, embracing scientific observation, and confronting uncomfortable truths, humanity can be moved toward a more harmonious and sustainable future.

Appendix I: Combinations

Embracing combinations of the components of reality is part of the holism achieved in systemic thinking (Fowler et al. 2024). Combinations are the focus of combinatorial mathematics. From a group of m things (e.g., six things), discrete sets of n (e.g., three) can be chosen. With six things taken three at a time, twenty distinct selections can be made. Items two, three, and six are one such combination, and two, four, and five another. Any of the infinite ecosystems of the biosphere involves a particular combination of species. All are part of the infinite complexity dealt with and accounted for in systemic thinking.

Overtly accounting for combinations is exemplified by the 195 countries of Figure 1. When nonrepeating subsets of ninety-seven are chosen, there are 2.86×10^{57} distinct combinations—a finite but numerous set. Graphically representing such a large number necessitates sampling. However, in the complexity of reality (in the real world), every single combination of this total is included, along with its distinct impacts on all other combinations—all other components of reality. Such components encompass various aspects of mental health and all their combinations. For example, there is depression and schizophrenia or extinction anxiety and addiction when taken in pairs. If there are 300 such mental disorders, there are 9.376×10^{88} combinations when taken 150 at a time. In the interconnected nature of reality, all such combinations are influenced by any lack of health in the systems to which humans are exposed or in which they participate. Of course, the reverse cannot be ignored; any progress toward a healthy, normal participation in reality (and all combinations of its parts) by humans will contribute to improved health for all things, including mental health and the prospects of systemic thinking—collectively improving systemic health.

In the construction of Figure 1, each individual country in the original data was represented by both estimated population size and measured area. For each set of ninety-seven that was randomly selected, the total area and the total population were calculated. The density for that group of countries was then determined by dividing the total population by the total area. The results are presented in log scale to show the order of magnitude of the abnormality (i.e., the pathological nature) of the human species for this metric of being a species—with all its consequences.

Figure 2 illustrates the population density of humans across 3,501 cities in the United States. From the perspective of systemic thinking (Fowler et al. 2024), if human density were within normal ecological bounds, ecosystems would not be subjected to the burdens currently imposed by urban concentrations. The number of ecosystem groupings is infinite, yet each one is impacted by every one of the combinations of 3,501 cities taken 1,000 at a time (there are about 5.1×10^{907} of them). Each one of these combinations, and every combination of combinations, exerts a distinct ecological impact that is essentially ignored in conventional analyses. In the context of this article, these ecological effects

are especially relevant because of their profound implications for mental health and cognitive functioning.

With regard to urban density, a shift to systemic thinking would include the various combinations of all mayors of the world's cities. Each combination would wholeheartedly acknowledge the ecologically cancerous quality (Hern 1993, 2008) of their cities—the pathological nature of cities. Similarly, for density in all counties, countries, and other subdivisions of the globe, all combinations of the political leaders would adopt the systemic paradigm by recognizing the infinite set of ecosystems under their administration and the degree to which there is pathological abnormality in human population density for each one—each a clear lack of systemic health. Thinking systemically also involves an acceptance of all the consequences of all combinations of pathological human characteristics—including, particularly, impacts by and on mental health.

Combinations of species are exemplified by the set of 124 species represented in Figure A1. This set of species can be sampled sixty-two at a time for 1.52×10^{36} distinct subsets, each of which presents us with normative information. Each one of these combinations serves to substantiate the conclusion that agriculture joins medicine (Bateson 1972) as part of the insanity being treated in this article. Similar patterns involve water consumption per unit area and CO_2 production per unit area (Fowler 2021). What are known as equivalence rules (in which normative information involves species of any body size) apply to numerous metrics for species and provide normative information to reveal related human abnormalities. The original work involving energy consumption per unit area was published by Damuth (1987) with data for 367 species of

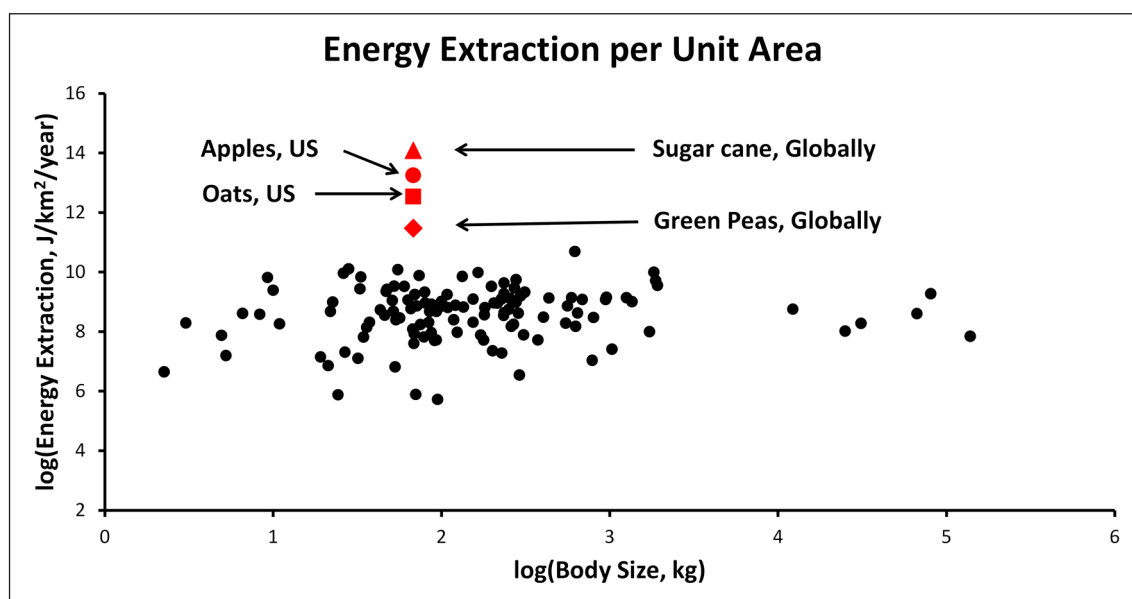


Figure A1: A comparison of the rate at which energy is extracted per unit area by humans with those of 123 species of nonhuman mammals (Fowler et al. 2024) to reveal the pathological nature of our practice of agriculture.

herbivores. These involve many combinations (e.g., 1.25×10^{109} , when taken 183 at a time). Again, each distinct combination is a source of normative information for both appraisal and guidance for being a normal species under existing circumstances—that is, including being impacted by human abnormality. Part of the holism of systemic thinking has to do with the option of normal human impact on and by every combination of species everywhere (Fowler et al. 2024)—systemic health with associated impact on mental health.

The combinations of people necessary for a paradigm shift are astronomical. For any group of 9,000 people, if they are sampled 4,500 at a time, there would be $1.57 \times 10^{2,707}$ combinations; each would need to have a majority thinking systemically. The adoption of systemic thinking would include groups such as the political parties of all countries, all CEOs of banking institutions, and the officials of both the Food and Agriculture Organization and the United Nations. It would involve every environmental organization, every family, all university departments, all religious leaders, and anyone contemplating integral thinking. Organizations such as the Lutheran School of Theology, the Yale Forum on Religion and Ecology, the Religious Naturalist Association, and the Center for Earth Ethics (and all combinations of such organizations) would all be on the same page. Also included would be all combinations of news analysts, authors, editors, and website designers. Globally, it would require the participation of world leaders, county executives or commissioners, all teachers, and the citizens of every country. Only by such widespread adoption of systemic thinking can humanity move beyond the insanity of conventional thought—the current paradigm.

Of course, the foremost combination is reality—ultimate reality. It is comprised of all combinations and permutations of its parts in the essence of their own existence over time and space. Each is a holistically integral part, reflecting all others and the wholes of which they are a part. In all cases, it is the truth of their interconnectedness that their natural integration represents—full veracity. Thus, in every case, each part represents holistic information about being that part—what it means to be that part—how to be that part. Our thinking, and all combinations of ways of thinking, are all parts of reality, and when they involve misinterpretation, inaccurate concepts, or other mismatches with reality, there is insanity.

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Notes

- ¹ See *New York Times Magazine*. 1946. "Atomic Education Urged by Einstein." May 25.
- ² William Rees. "Will Modern Civilization be the Death of Us? Have Humans Become Obsolete?" IRAS webinar, August 13, 2024. <https://www.youtube.com/watch?v=rsmekS6WDDk>.
- ³ See Fowler (2021) for a treatment of the definition of ecological abnormality as a pathological phenomenon. The term "pathological" is used following the dictionary definition of "being such to a degree that is extreme, excessive, or markedly abnormal" (<https://www.merriam-webster.com/dictionary/pathological>).
- ⁴ See Appendix I for a treatment of combinations.
- ⁵ <https://dictionary.law.com/Default.aspx?selected=979#:~:text=n.,due%20to%20age%20or%20injury>.
- ⁶ <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2254rank.html>.
- ⁷ https://www2.census.gov/geo/docs/reference/ua/ua_list_all.txt.
- ⁸ Thus, involving veracity or truth as explored in the correspondence theory of truth. See the references in <https://www.rep.routledge.com/articles/thematic/truth-correspondence-theory-of/v-1/bibliography/truth-correspondence-theory-of-bib>. Our concepts must be consonant with reality (Fowler 2021).
- ⁹ See the many references listed in <https://en.wikipedia.org/wiki/Self-organization>.
- ¹⁰ Such spiritual experiences were the focus of the 2025 conference of the Institute on Religion in an Age of Science.
- ¹¹ Is the shift to systemic thinking a matter of achieving Teilhard de Chardin's (1959) Omega Point to avoid the consequences of singularity (https://en.wikipedia.org/wiki/Technological_singularity)? The debate prompted by this question is well beyond the scope of this article, but the arguments presented are consistent with this conclusion.
- ¹² See the references contained in these two papers for accounts of the history of the development of the common ground of concepts such as natural integration, immanence, and the understanding of the holistic truth in everything as recognized in many of the world's wisdom traditions. See also Appendix 3 of Fowler et al. (2013).
- ¹³ The impact on what is observed today (e.g., our climate) by an exhalation by Jesus Christ at 3pm on his fourteenth birthday is taken into account in proportion to its actual influence. The same holds true for the influence of the position of Venus relative to the Earth, sun, and moon at one's moment of birth) on their personality later in life. The combinations (Appendix 1) of the effects of heavenly bodies are whatever they actually are (deep astrology).
- ¹⁴ Democracy is expanded to include other species so that they have a "vote" in providing holistic information about being a species of their kind. By their very existence, mammal species of human body size inform the human species about how to be (to exist, to participate) under the circumstances in which they are found.
- ¹⁵ A large group of philosophers have expressed similar conclusions—especially for individuals. Carl Jung (1928) said: "[T]here is no coming to consciousness without pain." Socrates, Friedrich Nietzsche, Søren Kierkegaard, Viktor Frankl, and Joseph Campbell all maintained concepts consistent with the view that meaning is often found through suffering. Many see the process of suffering as one of exposing insanity in the form of false beliefs. At the species level, Wendell Berry (in praising Charles E. Little's [1997] book, *The Dying of the Trees*; <https://www.ecobooks.com/books/dying.htm>) indicated that "[n]ature . . . has . . . a sterner sense of justice than we do." Joanna Macy (in Macy and Brown 1998) sees the resulting transformation, or "Great Turning," as the creation of "a life-sustaining society."
- ¹⁶ It would be deeply unethical for our species to attempt to reduce our population by 99.9% to achieve a semblance of normalcy; there is the impossibility of doing so in a way that would meet the imperative of racial and ethnic fairness. Systemically, such a self-imposed reduction is to be

avoided as it would be extremely abnormal; the maintenance of natural patterns is normally accomplished by homeostatic forces—often extrinsic or contextual forces.

- ¹⁷ As Berry says (<https://thomasberry.org/earths-desire/>), one of Earth's desires is "to be endured in the severity of her discipline." What Berry considers "discipline," John Burroughs (1912) considered "penalty." Will we ever be able to see the deeply positive side of such assistance? Is it not unethical, or immoral, to continue allowing the devastating impact we are having on all species, ecosystems, and the biosphere by resisting it?

- ¹⁸ <https://qurangallery.app/topics/submission-islam-universal-surrender-god-quran>.

Competing Interests

The author declares that they have no competing interests.

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From *Prāṇāyāma* to *Gelassenheit*: An Ontological Hermeneutics of Being

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This article offers a comparative ontological hermeneutics of being by placing the yogic discipline of *prāṇāyāma* (breath control) in dialogue with Meister Eckhart's mystical theology, especially his notions of *Abgeschiedenheit* (detachment) and *Gelassenheit* (releasement). Through a trinitarian ontological lens (not the Christian dogma), it argues that both traditions—though rooted in different metaphysical frameworks—converge in affirming that true freedom and peace emerge not from self-assertion but from radical self-emptying and openness to the divine. *Prāṇāyāma*, grounded in the *Yoga Sūtras* and Upaniṣadic thought, is interpreted not simply as breath control but as a transformative discipline aimed at stilling the mind (*citta-vṛtti-nirodhaḥ*) and attuning the practitioner to the ground of being. Likewise, Eckhart's path of detachment unfolds as a participation in the trinitarian dynamic kenosis. By correlating these approaches, the article develops an ontology of relationality—being as self-gift and receptivity—and highlights their therapeutic significance in light of contemporary neuroscience. It concludes by proposing a contemplative anthropology rooted in silence, love, and divine presence.



Introduction

The human search for inner peace, freedom, and spiritual wholeness transcends cultural, religious, and historical boundaries. In an era where concepts such as “peace” and “freedom” are often reduced to ideological slogans or consumer ideals, ancient spiritual traditions offer a radically different vision: a transformative journey of self-emptying, purification, and union with the humanity and the divine. These transformative journeys have the power to bring human beings to a profound realization that we are capable of coexisting in this world in a peaceful and harmonious manner, despite our differences. One of the primary obstacles in reaching this objective in the modern era is the polarization and transformation of the scientific field into a clericalism where only few are able to know it, while theology and philosophy have morphed into narrow-minded pursuits of scientific validation. I am honoured to share that my inspiration for this way of thinking originated from a powerful phrase I read in an article by Tom McLeish, which encouraged me to let go of any preconceived notions regarding the limitations of science or theology. The phrase, “This is to drop notions of the ‘boundaries of science’—or indeed ‘boundaries of theology’ for that matter” (McLeish 2021, 759), truly resonated with me and sparked a new perspective on the intersection of these two fields.

By conducting a detailed and comprehensive investigation, and utilizing both rational reasoning and creative imagination, this article delves deep into the intriguing intersection between ancient Indian yogic traditions, particularly the practice of *prāṇāyāma* (breath control), and the spiritual practice in the mystical theology of Meister Eckhart. Focusing on Eckhart’s concepts of *Abgeschiedenheit* (detachment) and *Gelassenheit* (releasement), this exploration aims to shed light on the potential connections and similarities between these seemingly disparate philosophies. Despite originating from separate metaphysical origins, these traditions both hold a strong belief in the idea that true existence is not found in the affirmation of the self but in its complete vulnerability and submission to a higher, more encompassing reality. This ontological perspective, particularly in the practice of yogic breathing—slow, regulated breath (*prāṇāyāma*)—offers unique insights and possibilities in the realm of scientific exploration, specifically in the field of neurological research.

Through the lens of a trinitarian ontological hermeneutics of being, this article proposes that detachment, both in Eastern and Western mysticism, is not a mere negation of selfhood but an active, dynamic participation in divine life. (According to Eckhart’s mysticism, there exists a certain level of passivity within the nature of the human intellect and mind, as it allows for the active involvement of a higher power). The trinitarian structure of being—characterized by relationality, self-giving, and perichoretic¹ unity—illuminates how the practices of breath control, meditative stillness, and interior detachment open the human being to communion with the divine ground and, ultimately,

finding the real essence of humanness. The adjective “trinitarian” points to a shared underlying vision in both systems regarding the nature of ultimate Being and its modes of manifestation. In Eckhart, the divine unfolds as Creator (Father), Redeemer (Son), and Guide (Holy Spirit); similarly, in Indian thought, Brahman² manifests as Creator (Brahma), Preserver and Guide (Vishnu), and Recapitulator (Shiva). This triadic structure also appears in dialectical patterns—thesis, antithesis, and synthesis—as well as in relational dynamics such as the lover, the beloved, and the love that unites them. By utilizing a hermeneutical approach to interpretation of texts from both traditions, my goal is to delve into a phenomenological exploration, where the transparent nature of phenomenology allows deep analysis of the ontology of being/Being as pure existence. Through this process, I aimed to imagine existence with an open and receptive mindset.

By drawing parallels between *prāṇāyāma* and *Gelassenheit*, this comparative study seeks to recover a vision of peace and freedom not as abstract ideals but as living realities achieved through bodily, mental, and spiritual integration. In doing so, it aims to show that both Eastern and Western mystical paths, when interpreted through the ontological structure of being, offer a profound contribution to the healing and destiny of humanity. This article invites all to approach the being-ness of our life with a theopoetic³ lens rather than philosophical or theological metrics.

***Prāṇāyāma*: Regulated Breath and the Path to Inner Purification**

Yoga, a physical, mental, and spiritual practice that originated in ancient India, has become an integral part of all the major religions that originated in South Asia, including Hinduism, Buddhism, Jainism, and Sikhism. It has also been embraced by individuals in other religions such as Islam and Christianity, making it a universal practice that transcends cultural and religious boundaries (Jacobsen 2005, 3). The *Yoga Sūtra* (I.2) defines yoga as “*yogas citta-vṛtti-nirodhaḥ*,” meaning the cessation of the transformation of awareness. According to the yoga traditions, when the transformation of awareness ceases, the real identity of the human being is realized. Yoga, in this context, means separation, isolation, and concentration, not union.

The *prāṇāyāma* can be traced back to very early Brahminic texts, particularly in relation to rituals (Eliade 1969, 108). The Upaniṣadic texts also relate *prāṇāyāma* to enlightenment, blending the traditions of *tapas* (discipline/austerity) and yoga. The ultimate goal, according to early yoga traditions, is stillness and the realization of an eternal, unchanging principle (Jacobsen 2005, 7). In the Indian philosophical tradition, *sāṅkhya* and yoga are studied together, where *sāṅkhya* is considered the theoretical and often atheistic framework of the Upaniṣadic teachings, while yoga represents its practical application. The main distinction

lies in yoga's eventual acceptance of the divine (*Īśvara*) as a crucial aspect of the path to liberation (Hiriyanna 1967, 268). However, for the purposes of this discussion, focus is directed towards the specific *prāṇāyāma* techniques outlined and taught within the rich and ancient yogic tradition.

The *Yoga Sūtra*, attributed to Patañjali⁴—"the grammarian who is known to have lived in the second century B.C."—comprises four chapters dealing respectively with the nature of mental concentration (*śamādhi*), the path toward it (*sādhana*), supernatural attainments (*vibhūti*), and finally the goal of liberation (*kaivalya*), which is defined as the isolation of the self from all conditioned reality (Hiriyanna 1967, 270, 294). The path to salvation (*mokṣa*) in yoga proceeds through *vairāgya* (detachment) and meditative discipline (*yoga*) (*Yoga Sūtra* I.12–16.). This requires a moral and ascetic foundation comprising *yama* (restraints) and *niyama* (observances). *Yama* includes noninjury (*ahiṃsā*), truthfulness (*satya*), non-stealing (*asteya*), celibacy (*brahmacarya*), and nonpossession (*aparigraha*). *Niyama* comprises purity (*śauca*), contentment (*santoṣa*), austerity (*tapas*), scriptural study (*svādhyāya*), and devotion to God (*Īśvara-praṇidhāna*) (Hiriyanna 1967, 294–95).

Following this ethical foundation, Patañjali outlines an eightfold path (*aṣṭāṅga-yoga*)⁵ consisting of physical postures (*āsana*), breath control (*prāṇāyāma*), sensory withdrawal (*pratyāhāra*), concentration (*dhāraṇā*), meditation (*dhyaṇa*), and absorption (*śamādhi*)—a rational and methodical ascent toward liberation (Hiriyanna 1967, 296–97). Within the context of the yogic system, it is important to recognize that *prāṇāyāma* is simply one aspect of a larger whole. However, through careful analysis and dedicated practice, one can come to understand that *prāṇāyāma* plays a crucial and central role in this system.

In the classical yoga tradition, particularly in Patañjali's *Yoga Sūtras*, *prāṇāyāma*⁶ is a crucial preparatory step for the attainment of higher consciousness. *Prāṇa*, the vital energy sustaining life, is intimately linked to breath. By regulating the cycles of inhalation (*pūraka*), retention (*kumbhaka*), and exhalation (*rechaka*), the practitioner disciplines not only the body but also the mind.

The suspension of breath during *kumbhaka* symbolizes a moment of profound stillness, wherein the individual self (*ahaṃkāra*) begins to dissolve. This process is not a passive abandonment but an active purification, preparing the inner space for transcendence beyond egoic consciousness. Thus, in yogic practice, breath serves as both a physiological and spiritual bridge to detachment and spiritual receptivity.

Within the philosophical framework of yoga, the concept of liberation (*jīvanmukti*) is often associated with the idea of *citta-vṛtti-nirodhaḥ*, or the cessation of mental fluctuations. According to the teachings of yoga, a person who has achieved liberation while still alive is often described as possessing *kaivalya*, or absolute freedom, which aligns with the concept of *jīvanmukti*.

As stated in Patañjali's *Yoga Sūtras* (I.3), the ultimate state of liberation is achieved when the constant fluctuations of the mind are brought to a standstill (*citta-vṛtti-nirodha*), and the seer, or the true self (*puruṣa*), finds peace and stability within its own nature (referred to as *svarūpe'vasthānam*, or abiding in one's own true nature). According to philosophy of yoga, the ultimate state of enlightenment is known as *kaivalya* (*Yoga Sutra* IV. 34), in which the three qualities of nature, known as *guṇas*, dissolve back into their source and the *puruṣa*⁷ radiates in its pure consciousness, completely liberated from all forms of bondage. This state can only be achieved when the body continues to exist until the remaining effects of past actions, or *karma*, have been fully exhausted. In subsequent yogic writings, this state is further defined and explained: according to the *Haṭha-yoga-pradīpikā* (IV.80–82), the practitioner who is fully immersed in *samādhi* and devoid of all desires is able to live in a state of liberation while still inhabiting a physical body; similarly, the *Śiva-saṃhitā* (V.210–12) depicts the *jīvanmukta* as someone who perceives the self in all things, remains unaffected by both pleasure and pain, and exists in a state of complete tranquillity. In this way, yogic literature presents the *jīvanmukta* as one who, through discipline, meditation, and absorption, realizes the self, transcends the binding power of *karma*, and lives free, desireless, and equanimous while still in the body. This notion bears a striking resemblance to the Eckhartian concept of breaking through, where one transcends the limitations of the mind to achieve true freedom.

Meister Eckhart: *Abgeschiedenheit* and *Gelassenheit*

In the mystical theology of Meister Eckhart⁸ (c. 1260–1328), *Abgeschiedenheit*—often translated as “detachment” or “seclusion”—occupies a central role in the soul's journey toward divine union.⁹ For Eckhart, *Abgeschiedenheit* is not merely a moral virtue or ascetic practice but an ontological event: the soul must be emptied of all created things, including its own selfhood, to become a pure ground where God can be born.

Thus, detachment is “an inward poverty”¹⁰ (poverty of spirit, cf. Matthew 5:3) that prepares the human being to receive God in absolute immediacy, beyond all mediation by concepts, images, or emotions. It involves a radical purification of the will, intellect, and affectivity, leading to an inner stillness (*Stille*) where the soul no longer acts from its own initiative but allows divine action to unfold within. Eckhart says: “For if a person wants really to have poverty, he ought to be as free of his own created will as he was when he did not exist” (McGinn, Bernard, and Colledge 1981, 200). This leads to the *Ledic sîn* (to be free, to be empty, to be detached, or to be released from attachment). This emptying goes even further to an absolute moment where one prays “to God that we may be free of *God*” (McGinn and Colledge 1981, 200), “who lives so that he may be free both of his own will and of God's will” (McGinn and Colledge 1981, 201).

Following this path, the soul reaches *Gelassenheit*— a term meaning “releasement,” “letting-be,” or “serene surrender.” *Gelassenheit* is the positive fruit of *Abgeschiedenheit*. It is not passive resignation but an active openness, a dynamic self-transcendence whereby the soul stands open and receptive before the uncreated ground of being (*Ungrund*). In *Gelassenheit*, the human will relinquishes its own assertiveness and instead becomes translucent to the divine will, allowing for a free and loving participation in the divine life of God.

The very core of this significant movement stems from the miraculous birth of the Eternal Word (*Geburt des ewigen Wortes*) within a soul that has been cleansed and purified. The concept of birth in this context is not simply a metaphor but rather a tangible expression of a true ontological connection with the trinitarian existence. Just as the Son is eternally begotten from the Father within the inner workings of the Trinity, similarly, the soul, devoid of all other distractions, becomes a sacred space where the Eternal Word is continuously spoken. In the depths of this profound and mystical union, the sense of individuality is not obliterated but rather transformed and elevated; the very essence of the soul is drawn into the all-encompassing embrace of the divine being, not through a process of absorption but rather through a radical and transformative interconnectedness that mirrors the infinite and boundless perichoretic existence of the Trinity itself—an eternal and unceasing circulation of selfless love and boundless openness.

Thus, *Abgeschiedenheit* and *Gelassenheit* mark the soul’s journey from egocentric autonomy to ecstatic participation in divine life. This transformation is ontological before it is moral; it affects the very structure of the soul’s being. Detachment is therefore not mere ethical self-denial but a participation in the kenotic self-donation at the heart of the Trinity—a movement of love, freedom, and being. Moreover, Eckhart stresses that such a transformation is not reserved for a religious elite but is the destiny of every human being, whose nature is to bear the image of God. The journey through detachment into *Gelassenheit* reveals the original nobility (*Adel*) of the soul: created from love, for love, and destined for unity with divine love.

By incorporating a fresh and unique perspective, this ongoing movement within the human life towards complete and ultimate freedom can be further enriched and enhanced. To Eckhart, even the concept of the Trinity, which is considered a central doctrine, can be perceived as a (mere) perception, because for him the reality behind it is the Godhead. Like a flowing stream, only in the stillness does one find the reality. Furthermore, it is from this specific perspective that man must also possess a certain level of detachment in order to attain the ultimate realization: the state of being in which an individual experiences a sense of indifference, not in a negative or apathetic manner but in a positive and ascetic way, towards all external factors and even their own thoughts and emotions. The detachment from everything and then the realization of one’s

own humanness is made possible through the process of being born as a human being (*Geburt des ewigen Wortes*). The ultimate salvation and liberation of humanity lie in embracing and embodying the essence and qualities of what it truly means to be human.

From *Prāṇāyāma* to *Gelassenheit*: An Ontological Journey

The journey from *prāṇāyāma* to *Gelassenheit* traces a profound path of inner transformation, beginning with the body and culminating in mystical union with the divine. Despite originating from distinct cultural and historical backgrounds, the yogic and Eckhartian traditions share a common belief in the importance of purifying the soul, achieving emptiness, and embracing openness in order to transcend beyond earthly limitations. As a result, the pressing inquiry that arises is whether this profound transformation of human existence is attainable solely by those who have achieved the mystical states described in both traditions. As observed in both traditions, it is evident that there is no definitive moment or ultimate climax in the mystical experience. Furthermore, there is also no rejection or denial of the concept that a person who practices *prāṇāyāma* or *Abgeschiedenheit* undergoes some sort of transformation.

As discussed, *prāṇāyāma* is not merely a physical exercise but a spiritual practice that regulates vital energy, aligning body and mind with the reality of *ātman*, the true self. According to B. K. S. Iyengar:

We should not do Yoga intellectually, but we should do Yoga using intellect, also mentally, emotionally. They should both meet: the emotional adjustment and intellectual adjustment. Then there is beauty. If you do intellectually, the body is shaking, so the consciousness is closed, it does not know. We have to do from the mind: mind exists everywhere, the brain exists only in the skull. So we have to use that intelligence which exists everywhere. (Holleman 1987, 141–42)

By focusing on the breath, the practitioner transcends mental fluctuations (*citta-vṛtti*) and attains inner stillness. This stillness reveals the soul's true divine nature and leads back to Brahman, beyond all duality—where the goal is not debate, but realization.

Similarly, in Eckhart, *Abgeschiedenheit* (detachment) and *Gelassenheit* (letting go) prepare the soul for the “birth of God” within, requiring the release of all attachments—even to spiritual experiences and virtues. “You should know that true detachment is nothing else but a mind that stands unmoved by all accidents of joy or sorrow, honour, shame or disgrace, as a mountain of led stands unmoved by a breath of wind” (Walshe 2007, 568–69). True *Gelassenheit* is achieved only when the soul becomes empty of all claims, letting God be God

in it without resistance or self-appropriation. Eckhart says, “This immovable detachment brings man into the greatest likeness to God. For the reason why God is God is because of His immovable detachment, and from this detachment He is His purity,¹¹ His simplicity, and His immutability. Therefore, if a man is to be like God, as far as a creature can have likeness with God, this must come from detachment” (Walshe 2007, 569). The challenge lies in comprehending the intricacies and nuances of the spiritual language used during the early Middle Ages, as it differs greatly from our modern understanding of spirituality. When Eckhart speaks about the human spiritual ascent (an ontological ascent), specifically in relation to the ontology of God, it is important for us to fully understand the meaning of his words. We cannot simply interpret them equivocally or univocally; rather, we must approach them analogically in order to truly grasp their significance.¹²

Theologically, this reflects the kenotic dynamic of the Trinity: being is a movement of self-giving and reception. As the Son receives from the Father without loss, so the soul, emptied in love, fulfills itself in participation in divine life. In the sermon 83, Eckhart states, “So if you do not wish to be brutish, do not understand the God who is beyond words. ‘Then what ought I to do?’ you ought to sink down out of all you’re your-ness (*dinischeit*), and flow into his his-ness (*sineseit*), and your ‘yours’ and his ‘his’ ought to become one ‘mine’, so completely that you with him perceive forever his uncreated is-ness, and his nothingness, for which there is no name” (McGinn and Colledge 1981, 207).

Thus, *prāṇāyāmic* emptying of breath and Eckhartian self-emptying, though expressed differently, both orient the person toward ultimate reality as an ecstatic movement beyond the self in love; moreover, this transformation is not a withdrawal from the world but a transfigured presence within it, where the yogic practitioner returns with awareness and compassion, and the soul in *Gelassenheit* perceives creation anew without possessiveness or domination. As Eckhart affirms, “But a detached heart desires nothing at all, nor has it anything it wants to get rid of. Therefore, it is free of all prayers, or its prayer consists of nothing but being uniform with God” (Walshe 2007, 572). Through *prāṇāyāma* and *Gelassenheit*, one undergoes a deep ontological transformation—from fragmentation to relational unity, from anxious striving to peaceful surrender, and from isolation to communion with the ground of being; both traditions thus reveal that true freedom lies not in self-assertion but in letting go, entering the divine movement of giving and receiving.

Perhaps the language used in these two systems could be considered outdated and simplistic, making it difficult for a scientific mind that constantly craves concrete evidence to fully comprehend. In order to successfully navigate through the complexities of modern and post-modern thought systems, it is crucial we dedicate ourselves to purifying and enriching our mental and

linguistic capabilities. By doing so, we can effectively overcome the challenges presented by these eras and acquire a “poetic language” that will allow us to fully embrace and understand the diverse and ever-changing realities of life (McLeish 2021, 770–71).

Healing and Wholeness: The Therapeutic Dimension

Aside from their profound metaphysical insights, it is worth noting that both the practice of yoga and the teachings of Eckhart’s mysticism have been known to possess a deep and therapeutic dimension, even though the physical effects of Eckhart’s mysticism have yet to be scientifically proven. By practicing breath regulation, meditative absorption, and releasement, one can achieve a state of harmonious balance between the body, mind, and spirit. These techniques work together to create a sense of inner peace and alignment within oneself. Meditation research highlights two key findings: the process of creating a sense of inner peace begins with the “control of breathing . . . slow breathing in particular” and produces an unusual level of “brain synchronization,” similar to slow-wave sleep (Fontanini and Bower 2006, 435). Through the “conscious control of slow breathing,” practitioners can induce a state of whole-brain integration while remaining awake (Fontanini and Bower 2006, 435). Functionally, this state is a “blend between the conscious control of thought” and a “cleansing and ordering of experience,” suggesting that meditation may evoke, in wakefulness, processes “that normally take place during sleep,” especially those related to memory consolidation (Fontanini and Bower 2006, 435).

When one surrenders their self-will and allows themselves to be open to the divine presence, they can experience a profound sense of healing integration that can positively impact their mind, body, and spirit. The physical benefits of this activity include soothing and calming the nervous system, as well as promoting overall physiological balance in the body. On a psychological level, achieving a state of mental clarity and peace involves letting go of anxious striving and reaching a state of calmness and stillness within the mind. Meditation is described as an altered state of consciousness marked first by the reduction of sensory input into a “mental isolation chamber,” leading to a “non-judgmental, receptive” state associated with relaxation and reduced anxiety (Dietrich 2003, 242). Second, it involves sustained attention through focus on “a mantra, breathing rhythm,” or similar objects, producing “heightened awareness” and the exclusion of distractions (Dietrich 2003, 242). This deliberate and sustained attention suggests activation of the “frontal attentional network,” with neuroimaging studies showing converging evidence of such activation, even appearing to challenge the transient hypofrontality hypothesis of altered states of consciousness (Dietrich 2003, 242). Within the spiritual realm, there is a profound awakening that takes place as one becomes aware of the true reality of divine love and the ultimate freedom it brings.

The concept of holistic healing suggests that humanity's ultimate purpose is not centered around individual autonomy but rather is about actively participating in a divine communion, in a spiritual language. It is about reaching a heightened level of consciousness that recognizes humanity as the true religion of life. Phenomenologically, meditation is described as a state of diminished frontal activity marked by "timelessness," "denial of self," and reduced "self-reflection and analysis," along with minimal emotional and cognitive content. Despite this reduction, the state is defined by "highly focused attention," distinguishing it from other altered states characterized by "aimless drifting" and culminating in a unifying experiential quality described as a "sensation of unity" (Dietrich 2003, 243).

Conclusion

We have journeyed from *prāṇāyāma* to *Gelassenheit*, uncovering a shared insight: true peace and freedom arise not from grasping but from letting go; through a trinitarian lens, such self-emptying is not loss but transformation into deeper relational participation in the divine life of love and communion. In our current world, filled with fragmented societies and anxieties centered around self-preservation and competition, the wisdom of both the East and the West beckons us towards a different way of living—one that embraces inner stillness, openness, and a deep trust in the life-giving presence of the divine. This path allows us to approach life with both reason and imagination, unlocking a deeper understanding of our surroundings. Thus, from *prāṇāyāma* to *Gelassenheit*, the human soul rediscovers its true destiny—to be not merely a being among beings but a transparent vessel of the Eternal Word, born anew in the silent depths of the soul. Through neurological studies, we have discovered that *prāṇāyāma* not only offers physical benefits but also guides us towards breaking free from the restrictive boundaries of the intellectual world. This new understanding opens a whole new path for us to explore and expand our minds beyond traditional disciplinary limitations. In the current era, we are experiencing a strong yearning to reverse the "wrong turns" (McLeish 2021, 759)¹³—moving from a deeply engaged, subjective contemplation of nature to a false ideal of detached objectivity; from valuing imagination alongside reason as a path to knowledge to privileging reason alone; from being a shared cultural pursuit to becoming confined within institutional and professional boundaries; and from interpreting the natural world as a poetic and theological "Book of Nature" to reading it as literal prose, thereby losing the richness of its symbolic and participatory meaning—that have occurred in the realms of science and theology, as evidenced by the numerous efforts to reevaluate and revitalize these fields of thought and study.

Notes

- ¹ “Perichoresis” is a theological concept (especially in trinitarian theology) referring to the mutual indwelling and interpenetration of the three divine persons—Father, Son, and Holy Spirit—without confusion or separation. Each person exists in the others in a dynamic communion of love. “Kenosis” is from the Greek *kenōō* (to empty). It refers to the self-emptying of Christ, especially in the Incarnation (cf. Philippians 2:7), where the Son freely renounces divine privilege to assume human nature. More broadly, it expresses a spiritual attitude of self-giving and humility.
- ² Brahman is the ultimate, absolute reality in Hindu philosophy—formless, infinite, and the ground of all existence. In Advaita Vedānta, Brahman is identical with *ātman* (the famous equation: *tat tvam asi*—“that thou art”). In Indian philosophy (especially the Upanishads), *ātman* is the inner self or true self—the deepest essence of a person, beyond ego and individuality. It is often understood as eternal, unchanging, and spiritual.
- ³ Theopoetics is an approach to theology that emphasizes symbol, metaphor, narrative, and imagination rather than strictly conceptual or systematic language. It seeks to speak of God in a way that is experiential, poetic, and open-ended, often highlighting mystery over definition. For reference, Amos Niven Wilder’s 1976 *Theopoetic: Theology and the Religious Imagination* (Philadelphia: Fortress).
- ⁴ It is important to note that when examining Indian texts, one realizes that Patañjali is not the founder of the yogic system but rather the collector of the *Sūtras*. The *Mahābhārata* mentions: “The promoter of *Sāṅkhya* is the great sage Kapila, it is said; the promoter of Yoga is the ancient Hiranyagarbha and no other” (*Santiparva* 12.337.60.).
- ⁵ The eightfold path outlined by Patañjali: 1. *Yama*—ethical restraints (*Yoga Sūtra* II.30). These are universal moral principles governing our conduct toward others: *ahimsa* (nonviolence)—refraining from harm in thought, word, and deed; *satya* (truthfulness)—alignment of speech and action with reality; *asteya* (non-stealing)—respecting others’ rights and property; *brahmacharya* (continence/moderation)—channelling one’s energy responsibly; *aparigraha* (non-possessiveness)—freedom from greed and unnecessary accumulation. 2. *Niyama*—observances (*Yoga Sūtra* II.32). Personal disciplines for self-purification: *śauca* (cleanliness)—physical and mental purity; *santoṣa* (contentment)—cultivating satisfaction with what is; *tapas* (discipline)—enduring effort toward self-transformation; *svādhyāya* (self-study)—reflection and study of sacred texts; *īśvarapraṇidhāna* (devotion to God)—surrender of the ego to the divine will. 3. *Āsana*—physical posture (*Yoga Sūtra* II.46). Defined by Patañjali as *sthira-sukham-āsanam* (a steady and comfortable posture). Serves as a foundation for meditation by stabilizing the body. 4. *Prāṇāyāma*—breath regulation (*Yoga Sūtra* II.49–II.53).
- ⁶ The practice of *prāṇāyāma*, which involves controlled breathing techniques, is not limited to the physical aspect of the practice but also encompasses the meditative state of *śavasana*. In a comprehensive work by Dona Holleman (1987), the rules, postures, and even sutras of *prāṇāyāma* are vividly explained. The content of this book is a direct transcription from tape recordings made by Dona Holleman during lessons given by B. K. S. Iyengar himself in London between the years 1970 and 1974.
- ⁷ In Sāṃkhya Yoga philosophy, *puruṣa* is the principle of pure consciousness, the passive witness (*draṣṭṛ*), distinct from *prakṛti* (nature), whose realization leads to liberation (*kaivalya*).
- ⁸ Eckhart (c. 1260–1327/28) was born in Hochheim near Gotha in Thuringia, Germany. He entered the Dominican Order as a youth, likely at Erfurt, and pursued his studies within the Dominican studia system. He studied in Cologne, where he came under the influence of Albert the Great (d. 1280), the eminent Dominican scholar, and through him the thought of Thomas Aquinas (d. 1274), whose synthesis of Aristotelian philosophy and Christian theology marked the intellectual climate of the period. Eckhart advanced rapidly within the order, becoming prior at Erfurt and the vicar of Thuringia (1294). He later studied and taught at the University of Paris, the leading the medieval theological faculty, where he earned the degree of *Magister* in theology around 1302, a title that gave him the name *Meister*. After teaching in Paris, he returned to Germany, holding administrative offices in Saxony and later serving in Strasbourg. His final years were marked by a

summons to Avignon, where proceedings were initiated against his teaching; he died before their conclusion, in 1327 or 1328 (Ruh 1989).

⁹ Detachment is the central theme in his sermons, even asserted by Eckhart himself: “When I preach it is my wont to speak about detachment, and of how man should rid himself of self and all things” (Walshe 2007, 152).

¹⁰ The terminology is “interior poverty” in the translation of Maurice Walshe (2007, 420).

¹¹ The term “purity” can also be translated as “emptiness” in this context.

¹² In Thomistic thought, “analogia” refers to the intermediate mode of predication between univocity (a term applied in exactly the same sense to different things) and equivocity (a term applied in completely different senses). Thomas Aquinas explains that when we speak of God and creatures using terms such as “being” (*ens*) or “good” (*bonum*), these are not predicated univocally (as if God and creatures shared the same essence of goodness or being) or purely equivocally (as if the words meant something completely unrelated). Instead, they are analogically based on a proportion or relationship based on causality and participation: creatures are good by participation, while God is good by essence. Aquinas distinguishes between analogia *entis* (analogy of being) and more specific modes such as the analogy of attribution (where a term is primarily based on a reality, e.g., the health of a body, and secondly on others, e.g., medicine or food) and the analogy of proportionality (where there is a proportionate relationship, e.g., sight to the eye as intellect to the soul). Thus, analogy safeguards both divine transcendence and genuine predication about God, avoiding the errors of anthropomorphism and agnosticism. Thomas treats this especially in *Summa Theologiae* I, q. 13, a. 5–6, where he articulates how names of perfection can be truly said of God while still acknowledging their analogical character.

¹³ Tom McLeish explores four “wrong turns”: 1. A turn from human contemplation of nature as subjects fully immersed in the world, toward an illusion of perfect objectivity. 2. A turn from the appreciation of imagination as a legitimate pathway to knowledge, in partnership with reason, to an elevation of reason alone. 3. A turn from science as a shared cultural experience, to a restricted, professional, and institutional expertise. 4. A profound misreading of the Book of Nature – that traditional metaphor of the natural world and our epistemological relation to it as ‘God’s Second Book’. If we were to understand science theologically, I will propose that we should rediscover how to read the world, not as prose, but as poetry.

Competing Interests

The author declares that they have no competing interests.

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Near-Death Experiences as Spiritual Transformations

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Near-death experiences (NDEs) occur in all cultures for many who are revived from clinical death. Anyone, from believers to atheists, can have one. The life-changing, spiritually transforming NDEs of medical doctors Eben Alexander and Tony Cicoria discussed in this article are amplified by the thousands of cases that doctors Pim Van Lommel and Jeffrey Long have researched. Van Lommel believes the current views on the relationship between the brain and consciousness held by most physicians, philosophers, and psychologists are too narrow for a proper understanding. Humans cannot be reduced to their constituent parts. Dr. Long studied 834 NDEs and colluded that they result in enhanced belief in divinity and the afterlife, decreased fear of death, and increased levels of compassion.



Introduction

Raymond Moody (1975), as a philosophy and, later, medical student, became fascinated by stories of people who had been resuscitated after being declared clinically dead. Starting with the Greeks, he collected 100 case studies and noticed that despite coming from individuals of different backgrounds and beliefs, many of the stories shared common elements. He found that people would often describe things such as:

- a feeling of being out of their body
- traveling through a dark tunnel
- encountering a bright light or a “being of light”
- reviewing their life in a rapid, panoramic fashion
- meeting deceased relatives or other spiritual beings
- a feeling of profound peace and love.

He described this collection of phenomena, which occurred to individuals who were close to death but returned to life, in his groundbreaking book *Life After Life*. The book is written in a clear, nontechnical style, making it suitable for general audiences, which has to the sale of 13 million copies.

Moody’s book brought the subject into the public consciousness, making near-death experience (NDE) a widely recognized term. Moody came from a skeptical, nonreligious family (Mace 2013). After fifty years of research, he has concluded that NDEs are real and like visits to another dimension of reality.

Interestingly, philosopher-theologian Paul Tillich (1959) has also written about interpenetrating dimensions, the horizontal and the vertical. The horizontal is the dimension of relations between finite material objects. The vertical is transcendent-spiritual. NDEs illuminate the spiritual dimension. It is unencumbered by organizational failings and historical atrocities performed in the name of religion. Spirituality involves ultimate concern, that which is of the greatest importance to us. It gives meaning, purpose, and guidance for living. Religion includes believing, behaving morally, and belonging to a community. Unlike illusions, NDEs are structured and lucid but often ineffable, like trying to write a novel with only half an alphabet. Music and art can help. NDEs nevertheless result in long-term behavioral changes, including life-changing spiritual transformations.

Dr. Alexander’s Near-Death Experience

Dr. Eben Alexander (2012), author of the best-selling book *Proof of Heaven: A Neurosurgeon’s Journey to the Afterlife*, had an NDE that transformed his life. Before this, he thought he understood what happened to the brain when people are near death and had always believed there are good scientific explanations for the out-of-body journeys described by those who narrowly escaped death. However,

after seven days in a coma, during which his brain showed a complete absence of neural activity in all but the primitive portions, he experienced something so profound that it gave him a reason to believe in consciousness after death. This included meeting his deceased sister, whom he never knew he had. He was able to verify her existence later.

Alexander (2012, 9–10) believes:

There is no scientific explanation for the fact that while my body lay in coma, my mind—my conscious, inner self—was alive and well. While the neurons of my cortex were stunned to complete inactivity by the bacteria that had attacked them, my brain-free consciousness journeyed to another, larger dimension of the universe: a dimension I'd never dreamed existed and which the old, pre-coma me would have been more than happy to explain was a simple impossibility.

But that dimension—in rough outline, the same one described by countless subjects of near-death experiences and other mystical states—is there. It exists, and what I saw and learned there has placed me quite literally in a new world: a world where we are much more than our brains and bodies, and where death is not the end of consciousness but rather a chapter in a vast, and incalculably positive, journey.

When Alexander was on Oprah Winfrey's show in 2012, she asked him if he had seen God. Alexander answered that God is neither a "he" nor a "she" but infinitely powerful, all knowing, infinite love, transcending time and space, symbolized by a brilliant orb of light and expressed by the sound "ohm." God does not have a face. Alexander's transcendent experiences were difficult for him to express in words. He said it was like trying to write a novel with only half the alphabet.

Alexander's NDE transformed him from a Christmas and Easter churchgoer to a deeply committed Christian. In the conclusion of his book, he states that his NDE was like a journey to a larger dimension of the universe.

Can Science Explain Near-Death Experiences?

Neurologist Dr. Oliver Sacks (2012), who considered himself to be a nonmilitant atheist who did not believe in an afterlife, chose the title "Seeing God in the Third Millennium" for his article offering a naturalistic, scientific explanation of Alexander's NDE.

For Sacks, a hallucination occurs when an individual sees something that others cannot see. A hallucinatory journey to the bright light and beyond, a full-blown NDE, can occur in twenty or thirty seconds, even though it seems to last much longer. Subjectively, during such a crisis, the very concept of time may seem variable or meaningless. Sacks believes the one most plausible hypothesis

in Alexander's case then is that his NDE occurred not during his coma but as he was surfacing from the coma and his cortex was returning to full function. Sacks (2012) finds it curious that Alexander does not allow this obvious and natural explanation but instead insists on a supernatural one: "Hallucinations, whether revelatory or banal, are not of supernatural origin; they are part of the normal range of human consciousness and experience. This is not to say that they cannot play a part in the spiritual life or have great meaning for an individual. Yet while it is understandable that one might attribute value, ground beliefs, or construct narratives from them, hallucinations cannot provide evidence for the existence of any metaphysical beings or places. They provide evidence only of the brain's power to create them." For Sacks, Alexander's NDE was not proof of heaven.

Near-Death Experience Awakens Classical Piano for Dr. Tony Cicoria

The lasting, life-transforming effects of NDEs may be hard to explain as neurophysiological artifacts. No neurophysiological finding can explain the full range of near-death phenomena. As words are inadequate to express the transcendent beauty of NDEs, perhaps music can help.

Tony Cicoria, then 42, was a well-regarded orthopedic surgeon in a small city in upstate New York. One afternoon in 1994, he noticed a few storm clouds in the distance; it looked like rain. He left a family gathering to go to a pay phone outside to make a quick call to his mother (this was before the age of cell phones). There was a little bit of rain, thunder in the distance. The following is a transcription from Cicordia's "Getting Comfortable with Near-Death Experiences: My Near-Death Experience A Telephone Call from God" and his YouTube video (Every Soul Knows – Film Series 2025).

My mother didn't answer. The phone was a foot away from where I was standing when I got struck. I remember a flash of light coming out of the phone. It hit me in the face. Next thing I remember, I was flying backwards like a rag doll.

Then I was flying forwards. Bewildered. I looked around. I saw my own body on the ground. I said to myself, "Oh shit, I'm dead." I saw people converging on the body. I saw a woman—she had been waiting to use the phone right behind me—position herself over my body, give it CPR . . . I floated up the stairs—my consciousness came with me. I saw my kids, had the realization that they would be okay. Then I was enveloped in a bluish-white river of light energy . . . an enormous feeling of wellbeing and peace. The highest and lowest points of my life raced by me. I had the perception of accelerating, being drawn up . . . There was speed and direction. Then, as I was saying to myself, "This is the most glorious feeling I have ever had"—*slam!* I was back.

Cicoria knew that he was back in his own body because he felt pain—pain from the burns on his face and on his left foot where the electrical charge had entered and exited—and he realized that only bodies have pain. He wanted to go back. He wanted to tell the woman to stop giving him CPR, to let him go. But it was too late—he was firmly back among the living. After a minute or two, when he could speak, he said, “It’s okay, I’m a doctor!” The woman, who turned out to be an intensive care unit nurse, replied, “A few minutes ago, you weren’t.”

Cicoria consulted a neurologist—he was feeling sluggish (most unusual for him) and having some difficulties with his memory. He found himself forgetting the names of people he knew well. He had a thorough neurological exam, an EEG, and an MRI. Again, nothing seemed amiss.

A couple of weeks later, when his energy returned, Cicoria went back to work. There were still some lingering memory problems—he occasionally forgot the names of rare diseases or surgical procedures—but his surgical skills were unimpaired. In another two weeks, his memory problems disappeared, and that, he thought, was the end of the matter.

What happened then filled Cicoria with amazement. Life had returned to normal, seemingly, when he suddenly, over two or three days, had an insatiable desire to listen to classical piano music. This was completely out of keeping with anything in his past. He had had a few piano lessons as a boy, he said, “but no real interest.” He did not have a piano in his house. What music he did listen to tended to be rock and roll. During a dream, he heard a musical tune. He tried to suppress it but could not.

Cicoria acquired a piano. In trying to teach himself to play the tune in his head, he realized he needed to take piano lessons.

In 2007, under the direction of Polly van der Linde, who runs an international piano camp for adults and children in [Old Bennington, Vermont](#), Tony gave recitals at the Sonata Adult Piano Camp. He played piano compositions by Chopin, Brahms, and an earlier version of his own composition, “Lightning Sonata.”

January 29, 2008, marked an important milestone in Cicoria’s musical career. He publicly debuted at the [Goodrich Theater in Oneonta, New York](#), presented by the [Catskill Conservatory](#) in association with the [State University of New York at Oneonta](#). The performance was assisted by a grant from the [NYS Council on the Arts](#). This performance was recorded live by [Granada Media UK](#), [BBC One](#), and [German National Television](#).

Cicoria was encouraged to have an interview with famous neurologist Dr. Oliver Sacks (2007), author of *Musicophilia: Tales of Music and the Brain*. Sacks suspected that Cicoria’s brain might be very different from what it had been before he was hit by lightning, or in the days immediately following, when neurological tests showed nothing amiss. Could Sacks now, years later, define the neurological basis of Cicoria’s love of music? Many new and far subtler

tests of brain function had been developed since Cicoria had his injury. Cicoria agreed during his interview with Sacks that it would be interesting to investigate this further, but after a moment, Cicoria reconsidered and said that perhaps it was best to let things be. His was a lucky strike, and the music, however it had come, was a blessing, a grace—not to be questioned.

Cicoria's NDE convinced him that our continuousness continues after death. One might conclude that his need for deeper spirituality was actualized as his obsessive need for the transforming effects of music. Music has always been an essential part in religious worship. Cicoria now believes in reincarnation and that we are placed here on Earth to become more spiritual. If we do not become spiritual enough in our first life on Earth, we will be reincarnated to try again.

Spiritually Transforming Art

For those who have experienced NDEs, they are ineffable, difficult to describe and explain. Perhaps art can help.

Theologian Paul Tillich (1955) experienced a transforming divine presence when seeing the painting of *Botticelli's Madonna with Singing Angels*. He described his "One Moment of Beauty" as follows:

Divine revelation comes to few, but understanding of it came to me one moment years ago. I looked, for the first time, at beauty revealed by a man who had been dead more than 400 years. As the son of a Protestant minister in eastern Germany in the days before World War I, I had grown up in the belief that visual beauty is unimportant.

Strangely, I first found the existence of beauty in the trenches of World War I. At 28, I became a chaplain in the German army and served for five ugly years until the war ended. To take my mind off the mud, blood and death of the Western Front, I thumbed through the picture magazines at the field bookstores. In some of them I found reproductions of the great and moving paintings of the ages. At rest camps and in the lulls in the bitter battles, especially at Verdun, I huddled in dugouts studying this "new world" by candle and lantern light. But at the end of the war, I still had never seen the original paintings in all their glory.

Going to Berlin, I hurried to the Kaiser Friedrich Museum. There on the wall was a picture that had comforted me in battle: Madonna with Singing Angels, painted by Sandro Botticelli in the fifteenth century. Gazing up at it, I felt a state approaching ecstasy. In the beauty of the painting there was Beauty itself. It shone through the colors of the paint, as the light of day shines through the stained-glass windows of a medieval church. As I stood there, bathed in the beauty its painter had envisioned so long ago, something of the divine source of all things came through to me. I turned away shaken.

That moment has affected my whole life, giving me the keys for the interpretation of human existence, brought vital joy and spiritual truth. I compare it with what is usually called revelation in the language of religion. I know that no artistic experience can match the moments in which prophets were grasped in the power of the Divine Presence, but I believe there is an analogy between revelation and what I felt. In both cases, the experience goes beyond the way we encounter reality in our daily lives. It opens up depths experienced in no other way. I know now that the picture is not the greatest. I have seen greater since then. But that moment of ecstasy has never been repeated. (Tillich 1955)

Without this transforming spiritual experience, Tillich might have suffered what is now called PTSD, Post Traumatic Stress Disorder. Tillich (1963) describes such transformations eloquently in his sermon “Spiritual Presence”: “Spiritual Presence is the transforming power within us but not of us, qualifying us for service in a new state of things. The Spirit can transform our moods of aggression and depression into stability and serenity. Spiritual experience is a reality for everyone, as actual as the experience of being loved and or the breathing of air. The Spirit is God present in communities and personalities, grasping them, inspiring them, and transforming them.”

Decades of Near-Death Experience Research

Let us now examine the decades of NDE research on thousands of patients who have survived cardiac arrest, as summarized in Dr. Pim van Lommel’s (2010) book *Consciousness Beyond life: The Science of the Near-Death Experience*; Dr. Bruce Greyson’s (2021) book *After: A Doctor Explores What Near-Death Experiences Reveal About Life and Beyond*, (2021); Dr. Jeffrey Long’s and Marjorie Woollacott’s (2024) paper “Long-term, Transformational Effects of Near-Death Experiences”; and Jonathan Kopel’s and Mark Webb’s (2022) paper “Near-Death Experiences and Religious Experience: An Exploration of Spirituality in Medicine.”

Cardiologist van Lommel designed a research study to investigate NDEs under the controlled environment of a cluster of hospitals with a medically trained staff in the Netherlands. For more than twenty years, van Lommel systematically studied NDEs in a wide variety of hospital patients who had survived a cardiac arrest.

He and his fellow researchers published their study on NDEs in the renowned medical journal *The Lancet* (2001). The article caused an international sensation, as it was the first scientifically rigorous study of this phenomenon. In this work, he gives a prospective analysis of 509 successful resuscitations of 344 Dutch patients who suffered a cardiac arrest. Of those, 18% had a NDE. In other studies, the percentage varies for adult cardiac arrest victims who recall a NDE. Melvin Morse (1996) found 85% among children.

Van Lommel came to the conclusion that the near-death phenomenon is an authentic experience that cannot be attributed to imagination, psychosis, or oxygen deprivation. He further reveals that after such a profound experience, most patients' personalities undergo a permanent change. In van Lommel's opinion, current views on the relationship between the brain and consciousness held by most physicians, philosophers, and psychologists are too narrow for a proper understanding of the phenomenon. Van Lommel shows that our consciousness does not always coincide with brain functions and that, remarkably and significantly, consciousness can even be experienced separate from the body, showing the continuity of human consciousness after the traditionally defined death of our body.

Interestingly, across all times and in many cultures, people have been convinced that the essence of man, usually known as the soul, lives on after the death of the body. So, an NDE seems to be a personal re-discovery of wisdom and insight that is ages and ages old but nowadays seem to be forgotten. In the past, these experiences were often known under different names, such as visions or mystical, religious, or enlightenment experiences, and in antiquity they were referred to as journeys to the underworld. Nowadays, we would classify most of these cases as near-death experiences. (Van Lommel 2022)

Greyson's book, *After: A Doctor Explores What Near-Death Experiences Reveal about Life and Beyond*, chronicles his four decades of scientific research into NDEs. Greyson is Professor Emeritus of Psychiatry and Neurobehavioral Sciences at the University of Virginia School of Medicine. In 1981, he was a cofounder and president of the International Association of Near-Death Studies. It provides research, information, and education about NDEs, supports those who have had them, and organizes periodic North American conferences.

As a physician with a scientific and skeptical background, Greyson initially dismissed NDEs as a quirk of the brain. However, after encountering a patient whose NDE contained details that were medically impossible for her to have known, he began a professional and personal journey to understand the phenomenon.

Greyson combines personal anecdotes from his career with extensive scientific research to present a new perspective on the relationship between the brain and consciousness. Rather than arguing for a specific religious or spiritual belief, Greyson uses the evidence from NDEs to challenge the traditional view that consciousness is solely a product of brain activity. He suggests that the brain might instead act as a filter or receiver for consciousness, which could be a fundamental part of reality not limited to our physical bodies.

Key themes and takeaways from the book include:

- **NDEs are common and transformative.** Greyson highlights that NDEs are not rare, and the individuals who experience them often report lasting and profound life changes, such as a reduced fear of death, a greater sense of purpose, and increased compassion.
- **The paradox of consciousness.** NDEs often occur when the brain is severely compromised, such as during cardiac arrest. Yet people describe heightened awareness and clear thinking during these times, which challenges the assumption that the mind cannot function independently of a fully operational brain.
- **A new understanding of the mind–brain relationship.** The book proposes that the evidence from NDEs supports an alternative theory where consciousness is not generated by the brain but may exist independently of it. Greyson explores this idea, prompting readers to reconsider what it means to be human and what the nature of consciousness truly is.

In essence, Greyson's book is a compelling and thought-provoking exploration of NDEs that seeks to bridge the gap between science and spirituality. It invites readers to open their minds to the possibility that death may not be an ending but a transition, and that our understanding of consciousness may need to expand to account for these experiences.

Long is a radiation oncologist and founder of the Near-Death Experience Research Foundation, whose website, NDERF.org, has validated 5,400 NDEs. He observes that 10–20% of people who are revived from life-threatening situations have an NDE. About 5% of the United States population have had them, according to a Gallup poll. They can happen to anyone: children, adults, clergy, religious, atheists, physicians, and scientists.

Long and Marjorie Woollacott (2024) authored “Long-term, Transformational Effects of Near-Death Experiences.” Here is the abstract of their study:

We compared 834 NDE responses with those of 42 individuals who had faced life-threatening situations (LTE) without experiencing NDEs. Our central finding reveals a significant transformation in values and spiritual attitudes among participants following their NDEs, as compared to individuals who were faced with life-threatening situations without an NDE. Key transformations include an enhanced belief in divinity and the afterlife, a decreased fear of death, and increased levels of compassion. Participants also reported a stronger belief in the meaningfulness of life and a profound shift in life priorities and values, emphasizing the increased importance of their spiritual or religious lives.

Long has also compared NDEs in our Western culture with those in the East. He has observed that the NDE experiences and symbolisms are similar. This

is consonant with the universal unconscious and inherited archetypes of Carl Jung, the renowned Swiss psychiatrist, who had a profound NDE during a heart attack in 1944. His out-of-body experience reinforced his belief in the continuity of consciousness after death and the connection between the psyche and universal consciousness. It also influenced his psychological theories and personal philosophy.

Kopel and Webb (2022, 11–12) conclude their paper “Near-Death Experiences and Religious Experience: An Exploration of Spirituality in Medicine” as follows:

NDEs touch upon the common religious experiences of human beings regardless of any previous religious or philosophical leaning. In general, viewing NDEs from a point of view informed by both science and religion may constitute a paradigm change in medical treatment, combining scientific research and belief with patient disease experiences with a new understanding of spiritual and medical relationships.

Since the Enlightenment, reductionism has been an important component of the development of science and Western civilization. The practice of abstracting and reducing parts of the universe to their essential components has greatly enhanced the knowledge of the physical and chemical laws in all realities. However, the medical paradigm of the 20th century undermined the human being’s holistic character. In this regard, the human person is seen not as a mechanical process defined exclusively by physical rules but as an interconnected totality. With the new medical paradigm, the complex social and environmental connections that influence human health and illness were more understood. New facts or interpretations can, just like with any perspective of philosophy or science, challenge or expand the current ideas, yet old paradigms are inflexible to take these changes.

Kopel’s and Webb’s holistic viewpoint is like Sister Callista Roy’s (2009) nursing philosophy, which views each person as a biopsychosocial adaptive system interacting with their changing environment. Spiritual transformations help individuals adapt to health challenges and achieve integrity, wholeness, and a good quality of life by managing stimuli across four adaptive modes: physiological, self-concept, role function, and interdependence.

Conclusions

NDEs are multifaceted phenomena that often extend beyond phenomenological curiosity into life-changing spiritual transformations. Scientific investigation into

these changes seeks to expand our understanding of consciousness, spirituality, and the human response to life-threatening events.

Through the stories of Alexander and Cicoria, this article has shown how NDEs are transformational for those who have them. van Lommel, Greyson, Long, and others have investigated thousands of NDEs. Those who have had NDEs show enhanced belief in divinity and the afterlife, a decreased fear of death, and increased levels of compassion. NDE experiencers also have a stronger belief in the meaningfulness of life and a profound shift in life priorities and values, emphasizing the increased importance of their spiritual and religious lives.

NDEs studies are advancing our understanding of who we humans truly are, created by the evolutionary process from cosmic stardust in the “image of God.”

Created from dust of stars afar,
We gaze in wonder at light from where galaxies are.

Why are we, cosmic created creatures, curious to see what happens in heaven? NDEs give new insights and visions of an afterlife so that all may “[k]now fully, even as I (we) have been fully known” (1 Corinthians 13:12).

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The author declares that they have no competing interests.

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What Does It Mean to Speak of Contemplation in the Natural Sciences? An Empirical Approach

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Monks contemplate, philosophers contemplate, but do natural scientists contemplate? This article proposes an empirical approach to this question. It argues that a bridge needs to be built between the vocabulary of contemplation in classical sources of spirituality and contemporary scientific experience. While contemplation is a well-studied phenomenon, this is primarily restricted to contemplation as a spiritual or philosophical practice. A methodological foundation is needed to establish what it means to speak of contemplation in the natural sciences. This article selects an epistemologically and cognitively orientated approach to contemplation found in the Christian medieval tradition and applies it to analyze and interpret the data from 104 in-depth interviews conducted as part of a recent international sociological study of physicists and biologists from four countries (India, Italy, the United Kingdom, the United States). Based on this analysis, the article offers a preliminary classification of the different kinds of contemplation embedded within contemporary scientific experience.



The Relationship between Modern Natural Sciences and Contemplation

Thomas Merton (1972, 1) once wrote: “Contemplation is the highest expression of man’s intellectual and spiritual life. It is that life itself, fully awake, fully active, fully aware that it is alive.” Derived from the Latin *contemplatio*, contemplation is an important term in spiritual and philosophical contexts as it translates the Greek *θεωρία* (Hart 2024, 26–27). Etymologically, *θεωρία* denotes a beholding or a seeing of something.¹ As a practice, contemplation is most frequently associated with the spiritual life. Various spiritual practices such as prayer (Merton 2018, 111–21) and *lectio divina* (Bouyer 2013, 77–78) can be termed “contemplative.” But it is not easy to define contemplation in an unambiguous and objective manner. By its very nature, contemplation is a practice that fully involves one’s interior life. Due to this subjective and immersive experience, practitioners and theorists of contemplation alike may disagree on what constitutes contemplation or what resembles a contemplative experience. For a start, there are several major contemplative traditions around the world: Christian (Laird 2006), Islamic (Badri 2018), Buddhist (Wallace 2006), and Daoist (Roth 2021). Within the Christian tradition, there are debates regarding whether contemplation should be distinguished from meditation (Hart 2024, 38–46; Bouyer 2013, 93–101; Baier 2019). This emerges as part of a wider debate on whether contemplation is of a purely passive character or whether it is a form of activity (Bouyer 2013, 101–10). In more mystical traditions, contemplation aims at reaching a state of immersive beholding in which the subject and the object of vision become one (Hadot 1993). This rich depth also makes Merton (1972, 6) say this about contemplation: “The only way to get rid of misconceptions about contemplation is to experience it.”

In ancient Greek and early Christian philosophies, to contemplate is an end in itself, since it is regarded as the highest form of human activity (cf. Aristotle, *Nicomachean Ethics* X.7; Origen, *Commentary on John*, I.91–92). In light of this contemplative ideal, for centuries, inquiry into nature was situated within the contemplative life (*vita contemplativa*) (Hadot 2006, 95–98; Lollar 2013, part I). The ancient Greek “physics of contemplation” involved beholding the universe in its full grandeur. This physics of contemplation stood in contradistinction to the “physics of utilisation,” which strived to unveil the secrets of nature through human technology for the sake of overcoming nature (Hadot 2006, 91–94). The ideal of beholding nature (*theoria physikē*) also occupied a central place in early Christian natural philosophy (Lollar 2013; Foltz 2013, 158–74; Christie 2013; Ip 2022; Costache 2025). In early Christianity, contemplation trains the human in every philosophical virtue (cf. Maximus the Confessor, *Ambigua to John* 10.2). Training one’s mind to contemplate visible things, such as nature, cultivates the virtues required to gaze at higher invisible mysteries, the highest of which is the vision of God (cf. Origen, *Commentary on the Song of Songs*, prologue, sec.2).

In the tradition of Greek and early Christian philosophy, the *vita contemplativa* forms the key context in which the study of nature was situated.

We can speak of monks contemplating, philosophers contemplating, but can we speak of natural scientists contemplating? Does it make sense to situate contemplation in the context of the modern scientific life? One influential narrative suggests a shift in the relationship between scientific inquiry and contemplation in modernity. According to Hannah Arendt (1958), the rise of the natural sciences and its success—in the case of Galileo, for example—initiated a reversal of the relative importance between the contemplative (*vita contemplativa*) and the active life (*vita activa*) in relation to human knowledge seeking. The success of modern science, in this narrative, has shown that human *doing* and the products of our hands (e.g., telescope and experiments) are indispensable for gaining access to sure knowledge. This discovery, according to Arendt, has led contemplation to become increasingly meaningless in modernity, having been gradually replaced by the ergetic ideal (Greek: *ἐργον* = “work”) as the primary way of human access to knowledge (Arendt 1958, 289–94; Funkenstein 1986, 290–99). This narrative suggests that unlike in ancient Greek and early Christian natural philosophy, modern natural sciences have eliminated contemplation as the key context for knowledge seeking. Sociologically, this shift in epistemological ideal also goes hand in hand with a shift of modern scientists’ perceived location in society: “The *vita contemplativa* as the circumstance for the pursuit of natural knowledge was being replaced by the *vita activa*, the re-situation of the man of science from the cloistered domain of contemplation to the civic sphere” (Shapin 2010, 41).

But the absence of an organic relationship between contemplation and modern scientific inquiry is by no means absolute. There are exceptions to this narrative in both biology (Gedda 1967) and physics (Russell 1993, 138–44). More recently, some contemporary scientists have called for a revival of the contemplative nature of scientific inquiry (Francel 2016; Heller 2016). An important scientific voice here is the late British theoretical physicist Tom McLeish (2014), who argues that the ultimate value of natural scientific research today cannot be detached from a reconfiguration of the relationship between scientific inquiry and contemplation.² While accepting the diagnosis that modern science is largely severed from the *vita contemplativa*, McLeish (2021) proposes that today’s natural sciences need to recover what he calls the “contemplative stance.” For McLeish (2014, 20), this means a recovery of the ideal that the natural sciences are a seeing that heals—one where humans are reconciled with the “sheer inhuman otherness of matter.”³ What makes this bold is that by presupposing the vitality and centrality of contemplation is possible in the context of contemporary natural scientific research, McLeish implicitly extends the domain of contemplation beyond spiritual and philosophical life to encompass contemporary scientific life. To make this extension, however, raises a critical question: Which parts of the

scientific experience in contemporary natural sciences might be identified as “contemplative”?

In this article, I set out an empirical approach to address this central question. To offer an intelligible account of contemplation in the natural sciences today, a bridge is needed between the vocabulary of contemplation in spiritual and philosophical contexts on the one hand and that of the scientific research life as it is lived and practiced today on the other. While there is a wealth of scholarship in the rapidly growing multidisciplinary field of contemplative studies (Komjathy 2017; Flanagan and Clough 2024), there is a gap in the literature that can be filled by drawing from sociological research into scientists to probe the phenomenon of contemplation in the natural sciences. Although the emerging body of sociological literature on the spirituality of scientists has covered a wide range of phenomenon such as enchantment (Nicoli, Sbalchiero, and Vaidyanathan 2024), beauty (Ivanova et al. 2024), spiritual yearning (Nicoli, Sbalchiero, and Vaidyanathan 2025), and spirituality more generally (Di et al. 2021), it has not touched on contemplation. What does not yet exist is an empirical approach to study contemplation in the natural sciences that (a) is based on a rigorous account of contemplation and (b) can draw from data in the sociological study of spirituality in natural scientists. This gap significantly hinders the possibility of utilizing the growing body of sociological research in this area for the purpose of theorizing about the nature of contemplation in a natural scientific context.

This article attempts to fill this gap through a history-of-ideas-driven approach to studying contemplation empirically. To provide a preliminary picture of what contemplation might look like in a scientific context, I draw from an epistemologically and cognitively driven definition of contemplation from a key medieval theorist of contemplation, Richard of St. Victor (d. 1173). As I argue in section two, while this framework is neither comprehensive nor universally accepted,⁴ its epistemological and cognitive orientation renders it a useful heuristic for empirical research into contemplation in contemporary scientific experience. I first sketch out this framework and explain why it is useful for our task (sec. two), before applying it to interpret the scientific experiences of biologists and physicists in four countries (India, Italy, the United Kingdom, the United States) from a recent international sociological study of the spirituality of scientists conducted by *Spiritual Yearning in Science* between 2023–26 (secs. three and four). I end by discussing the insights gained from this qualitative analysis and some major limitations (sec. five).

What Is Contemplation? A Methodological Heuristic for an Empirical Approach

What, then, is contemplation? For the purpose of this article, I propose a heuristic that is theoretically coherent and empirically useful for our question.⁵ One of the most systematic frameworks of contemplation can be found in the work of medieval thinker Richard of St. Victor, a twelfth-century philosopher known as

one of the major theorists of contemplation (Aris 1996; Palmén 2014; Hart 2024, 38–46; 79–83). Richard’s approach to contemplation represents an important synthesis of Greek philosophy on the one hand and of early Christian traditions on the other (Palmén 2014, 13–49). As such, it can be regarded as an expression of one major contemplative tradition. More importantly for the purpose of this article, while Richard’s framework was originally set out in a spiritual and philosophical context, it is very useful from the practical point of view for undertaking qualitative analysis of reports of scientific experience. This is because his framework defines contemplation primarily based on epistemological and cognitive considerations without “restrict[ing] it to certain Christian presuppositions and spiritual disciplines” (Baier 2009, 329). This makes it relatively straightforward to translate Richard’s vocabulary of contemplation into a scientific context. As we shall see, this framework has the advantage of being able to easily bridge the language of contemplation in the context of the spiritual life with the language commonly used by scientists to speak about their scientific research.

According to Richard of St. Victor (1957, 15–56), contemplation is a mode of knowing that spans all possible forms of human knowledge.⁶ To reach the character of contemplation, he distinguishes between three human abilities for knowing (*Benjamin Minor* I.7, Richard of St. Victor 1957, 145–46):

- through the imagination, directed at sensible things that are visible and can be perceived by the bodily senses
- through reason, directed at intelligible things (*intelligibilia*) that are invisible but can be grasped by reason (e.g., ideas and principles)
- through understanding, directed at intellectible things (*intellectibilia*) that are invisible and incomprehensible by human reason.

Each of the three modes of knowing can serve as the primary basis for a form of contemplation. Moreover, we must recognize that two of the triads of imagination, reason, and understanding can combine to form a distinctive mode of contemplation. For instance, we can perceive the world primarily *through* the senses but *aided by* reason. This gives rise to Richard’s classification of six possible types of contemplation (Table 1; Palmén 2014, 255–65).

Table 1 outlines a basic framework that can be used to identify potential instances of contemplation in contemporary scientific experience. As the practice of contemplation has much greater depth than what is described, Table 1 should be regarded as a heuristic that captures an important dimension of contemplation without exhausting it. As shown by the third column, the usefulness of Table 1 springs from the way it relates contemplation to various kinds of knowing familiar in the contemporary scientific context.⁸ From the perspective of conducting qualitative analysis, Table 1 provides the researcher a stable reference point for bridging the theoretical landscape of contemplation and contemporary scientific practices.

Description	What it involves	Example
In the imagination and according to the imagination only	Marvel at visible things without thinking	The mind wonders at magnets
In the imagination but according to reason (<i>in imaginatione et secundum rationem</i>)	Consider visible things from the rational point of view (e.g., cause and reason for its behavior)	When we look for the reason and identify the way magnets attract and repel each other
In the reason according to the imagination only (<i>in ratione et secundum imaginationem</i>)	Reason about invisible realities based on similitude observed in visible things	We notice different magnets that instantiate that the same behavior of attraction and repulsion can be universalized
In the reason and according to the reason (<i>in ratione et secundum rationem</i>)	Reason about invisible things that the mind cannot know through images of sensory things but can know through reason alone	When we discern the mathematical symmetry underlying James Clerk Maxwell's equations that describe electromagnetism
Above reason but not contrary to it (<i>supra sed non praeter rationem</i>)	Be concerned with things the mind cannot discover by reason alone, things that transcend the limits of human capacity to know but are not contrary to it	We grasp that there is a universal rational order underlying the world, to which the coincidence of mathematical symmetry and electromagnetism found in Maxwell's equations bear witness
Both above reason and contrary to it	Engage with those things that are beyond or even seem to be against reason	We behold and delight in the triune nature of divinity: three persons who are one ⁷

Table 1: Six modes of contemplation according to Richard of St. Victor. This table draws significantly from the analysis in Rik van Nieuwenhove (2012, 138–39).

Method

The primary research question driving the following qualitative analysis is this: What might the possible manifestations of contemplation look like in the context of contemporary scientific experience? The data for this analysis was collected by a team of sociologists in the international project Spiritual Yearning in Science.⁹ In this study, researchers conducted 104 sixty- to ninety-minute in-depth interviews with biologists and physicists across four countries (India, Italy, the United Kingdom, and the United States) between November 2023 and May 2024. Participants were recruited from a previous international study of scientists conducted in 2021.¹⁰

In the recruitment material, the project was described as “a study designed to investigate the deeper motivations that drive scientific inquiry, experiences that scientists find profoundly meaningful, and obstacles to achieving a sense of connection and fulfilment,” without explicit mention of “spirituality” to eliminate bias against the term. Respondents were asked to consider a number of prompts before the interviews: “(1) Think of times either in your work as a scientist or elsewhere when (if at all) you felt a profound sense of connection with (i) nature, (ii) yourself, (iii) others (iv) and/or God or a higher power.

(2) Do you ever feel a desire or yearning for deeper connections in these areas? If so, what, if anything, do you do to achieve those?” In the interview guide for the project, the research team delved into the following key topics: experiences of (dis)connection with nature, self, others, and God or a higher power; spiritual yearning; (dis)enchantment; mystery; and meaning. The interviews invited participants to share anecdotal experiences rather than specify personal beliefs. Related to the purpose of this study, it is important to mention that interviewers did not specifically directly ask the participants to ponder or discuss “contemplation” (or related words) during the interviews. Table 2 summarizes key demographics of the in-depth interview sample.

Characteristic	N
Spiritual Identification	
Spiritual but not religious	40
Neither religious nor spiritual	29
Religious and spiritual	29
Religious but not spiritual	6
Country	
India	25
Italy	27
United Kingdom	25
United States	27
Discipline	
Biology	56
Physics	48
Gender	
Female	37
Male	66
Non-binary	1
Total	104

Table 2: Demographic overview (Nicoli, Sbalchiero, and Vaidyanathan 2025).

After data collection was completed, all interview transcripts were uploaded into ATLAS.ti, a qualitative data analysis software. To manage the large amount of complex data and identify key themes, the research team developed a coding scheme using ATLAS.ti to effectively identify interview passages relevant for subsequent analysis around key themes. This was done by tagging relevant passages with corresponding codes related to the key topics mentioned.

Since the original study was not designed to directly answer this article's research question on contemplation, I proceeded with a secondary data analysis to identify the relevant data for this study, as follows. First, I focused on the code "NATURE," which comprised a large number of text segments relevant to a sense of (dis)connection with nature reported by the interviewees. After the text segments related to a sense of connection with nature were identified, I narrowed the scope of my dataset to passages reporting experiences specifically related to scientific work. Finally, from this dataset, I identified passages reporting experiences that most closely resembled "contemplation," defined according to the heuristic outlined in Table 1. I then classified each of them according to the six-fold classification of contemplation. It was in this final step then where theological and philosophical informed interpretations entered the data analysis.

Kinds of Contemplations in Biology and Physics: A Qualitative Analysis

I will now present reports from biologists and physicists of different orientations towards religion and spirituality who have experienced moments in their professional work that resemble different kinds of "contemplation." Apart from the sixth kind of contemplation, which was entirely absent in the data, I have identified a number of paradigmatic examples under each of the first five kinds of contemplation. These examples offer a preliminary picture of what each type of contemplation might look like in the context of contemporary scientific practice.

Contemplation 1: In the Imagination and According to the Imagination Only

The first kind of contemplation is invoked by a direct encounter with the natural world. One marvels at what they see when they are exposed to raw nature. The most frequent way scientists engage in this kind of seeing within their work is through the sensory vision of nature acquired through the aid of an instrument. The experimentalist, for example, is aided by the technology for contemplating the sensory world. Through the instrument, one gains access to a sense perception of the microscopic world. As one Indian biologist said, "I was doing NMR [nuclear magnetic resonance] which, which shows how atoms are jumping across protein molecule. And when I see that molecule, I just jump like a kid . . . it tells me something as small as I can see like science has enabled me to see all of this" (ID_ SBNR_IN-B-F-SBNR-2659).¹¹ It is as though the experimental apparatus opens up multiple layers of sense perception, so that the invisible microscopic world acquires yet another status—alongside simply being unobservable—as visible in a technologically assisted vision.

One Italian biologist considered such a sight through sensory perception analogous to an encounter with aliens:

As I said, my parents had an analytical laboratory, and one day they brought home a microscope they no longer used. And I used to look at everything with this microscope. I was surprised at the single-celled microorganisms that swim around, make funny little moves, and have weird shapes that I had never seen before. To me, it was like observing extraterrestrials in another dimension. So, these little soft animals, swimming funnily, some even transparent, I remember it as a very exciting fact. It was like going to Mars and meeting the Martians. I was seeing living things for the first time that I had never seen before. (ID_N_IT-B-F-N-6070)

It is characteristic of this kind of contemplation that one's perception is entirely fixed upon what is seen before one's eyes. What this biologist is marveling at is not some intellectual reason behind the microorganisms' behavior but simply the microorganisms themselves seen under the microscope.

Contemplations 2 and 3: In the Imagination and According to Reason, and In Reason and According to Imagination Only

The second and third kinds of contemplation are frequently encountered amongst natural scientists, though it is sometimes difficult to distinguish between contemplation of the underlying structure of a plant or how a physical process works in the natural world (in the imagination according to reason) and contemplation of an intelligible physical principle such as a law of motion or an abstract idea of a natural thing aided by analogies found in nature (in reason according to imagination). Scientists typically do not distinguish neatly between these two kinds of experience. In the scientific life, these two kinds of contemplation are often simply described as experiences of understanding how nature works.

On one end of the spectrum, some scientists report that when they are in the natural world, they "see" the scientific reason underlying what they observe through their senses. For example, a British physicist said that "when I walk around in the street . . . I see things that most people don't see because I studied it . . . I see a river, I'm thinking about the three dynamics. I see the equations" (ID_ SBNR_UK-P-M-N-17786). This kind of seeing is clearly engaged in looking at something perceivable by the bodily senses—sight and hearing—through the perspective of scientific reason. This can also occur in the laboratory setting, where experimental scientists make use of instruments for glimpsing the scientific explanation underpinning the behavior of things perceived by the senses. One Italian biologist described her work with a microscope as enabling

her “to have a glimpse of what life actually is” (ID_SBNR_IT-B-F-SBNR-8698). The microscope thus acts as an instrument that enables the scientist to engage in a kind of contemplation of the biological principles underlying embryonic development, and the effects of genetic defects on morphology, through sight. Another Italian physicist described a similar experience, this time in the context of X-ray experiments: “And, again, at work, when I am taking on X-ray experiments, it’s like having an extra eye to look inside the materials, to see how the atoms are arranged, with their geometry, what the distances are” (ID_RNS_IT-P-F-RNS-10203). In these cases, the scientist in question engages in observation through bodily senses, but what is “seen” and “glimpsed” are in fact the underlying scientific principles—fluid dynamics, embryonic development, and atomic structure—graspable through reason. These cases, then, constitute contemplation in the imagination but according to reason.

On the other end of the spectrum, some scientists reported how closely observing the behavior of material things perceived by our senses offers an aid for contemplating the intelligible principles underlying the natural world. One remarkable incident captures how contemplation in reason and according to imagination works vividly in a scientific context:

[O]ne day I went to my bathroom and there was my charger hanging, the wire, and it was oscillating slightly. It’s a very random thought, but I thought, could you make a Foucault pendulum with this? . . . So usually Foucault pendulum are very long because . . . you need them to be very long to avoid some problems. If they are too short, then the Foucault rotation is not observable anymore for some mechanical reasons . . . So the remedy to this is to make it very long, but it also depends on the amplitude of the motion. Then I saw this wire and I thought, okay, the wire is very short, but the amplitude is very small. It was like a millimeter. So I thought, could you compensate those mechanical effects of a short pendulum with a very short amplitude? So then I went to the lab and I made a short pendulum, and I made it oscillate with a very small amplitude. I measured the amplitude, it was millimeters. I measured the amplitude with an optical setup, and I could make a Foucault pendulum like this, was probably the shortest that exists. So it’s not visible in your eyes. You can almost not see the oscillation, but you record it, and you can measure indeed the rotation of the Earth. (ID_SBNR_UK-P-M-N-17786)

The sight of the charger dangling provided the material similitude to the universal principles of the Foucault pendulum. Through the help of this observation, this physicist was able to contemplate a hitherto unimaginable setup of the Foucault pendulum. This instance is an example of an intelligible thing, that is, a scientific idea, conceived based upon an observation by the senses.

The example of the Foucault pendulum enables us to distinguish the subtle difference between contemplation in the imagination according to reason and contemplation in reason according to imagination. Consider the following example from one Italian biologist, reflecting on a contemplative moment brought about by the extraction of DNA: “Something that always attracted me in doing research is the fact that the type of experimental techniques I use are very visual. I use the microscope to observe how embryos develop, if they have any defects, how genetic defects lead to alterations in the morphology of structures and in their functioning. So, basically, I have to look at many pictures. Every time I look at the results of an experiment at the microscope, I get this feeling of being able to have a glimpse of what life actually is” (ID_SBNR_IT-B-F-SBNR-8698).

For this biologist, what she contemplated remained the object seen under the microscope. But she did so aided by scientific reason, which enabled her to contemplate the principles behind embryonic development. This can be an instance of contemplation in the imagination according to reason, which differs from the previous example of the physicist. In the previous example, the physicist was contemplating the theoretical principle for creating a workable Foucault pendulum. But he did so aided by the similitude found in the hanging charger perceived through his senses. In this case, the physicist engaged in contemplation in reason according to imagination.

Sometimes, it is difficult to place precisely whether a scientific experience resembles the second or third kind of contemplation in our classification. Consider the following experience reported by a British biologist working with an electron microscope:

There were also electron microscopes that . . . [get you to] see things in really great detail. You could see cells on a huge scale rather than just lots and lots of little cells. Actually, I think the regular light microscope sometimes some of the plants were extremely uniform and they had a grid pattern of these cells and like I say the process of mitosis you could see the different things lining up and this perfect array of you can see the different stages in here and it all looks so beautiful. It's the thing I feel like I could hang on my wall and appreciate. (ID_N_UK-B-F-SBNR-12641)

Was this biologist contemplating mitosis—a process that exists as a universal intelligible principle governing cell division according to reason—or the visible cells she could see under the microscope? It sounds like she was contemplating both, one in the other. Unlike in physics, where the intelligible principle seems to exist abstractly, in mathematical forms, it is more difficult to imagine biological principles in the same way. This example illustrates that in biological sciences, sometimes the second and third types of contemplation can be borderline overlapping.

Contemplation 4: In Reason and According to Reason Only

While the second and third types of contemplation are typically reported amongst both physicists and biologists, contemplation in reason and according to reason only is more restricted in its spread. This kind of pure contemplation of the invisible and intelligible principles of the natural world unaided by sense perception is strongly associated with the experience of theoretical physicists working at the high level of abstraction.

Theoretical physicists frequently work with purely mathematical structures such as symmetry groups, sets of differential equations, and asymptotic behaviors of functions. These scientists do so in order to discern potential applications in the natural world. What distinguishes this kind of contemplation from the second and third types is that the actual work in the fourth kind of contemplation involves pure theoretical vision without reference to sense perception. This kind of contemplation, as one American physicist described, is thrilling and satisfying: “I’m a particle physicist. I guess whenever I was actually just learning quantum mechanics for the first time, the moment I got a really firm grasp on those wave equations, I’m like, ah, this is it, this is the stuff that’s governing all these processes. I think mostly just having an on-paper understanding of the mathematics of some of the fundamental stuff in the universe gave me a sense of connection to nature. It’s like, I get it” (ID_SBNR_US-B-F-SBNR-GRAD-23501).

Perhaps more than any other kind of scientist, theoretical physicists are the closest to practicing the Platonic-like ascent beyond the material world toward the world of intelligible ideas in the modern scientific context. The structure of this type of work—and the satisfaction it provides—is considerable, as one United States physicist said:

It’s like if you’re looking at a picture, if you’re looking at some artist’s drawing, and at first it seems like you don’t exactly get why they drew it, or you don’t understand the purpose behind it. And then suddenly something clicks, and you see like, ah, they’re trying to represent, I don’t know, the frustration of humanity at blah blah blah. And then you feel like you suddenly get the purpose of all of this kind of chaos that you see. There’s a joy in being able to comprehend things and being able to take complicated systems or chaotic systems and explain them in very simple terms. I think is incredibly rewarding. (ID_RS_US-P-M-RS-23324)

This physicist’s description offers a glimpse into how this type of scientist places contemplation in reason and according to reason alone into the research process. Initially, one encounters the messiness and chaos in the perception of the natural world through the senses. But through a scientific study of the intelligible principles underlying the phenomenon, the scientist is suddenly able to see order and purpose underlying the apparent chaos.¹² This kind of contemplation can

possess a quality that some scientists consider more valuable and substantial than “mystical experiences,” as one Italian physicist reported that “to have the idea that there are exact fundamental laws, which we can express mathematically, and everything is the manifestation of these fundamental and very complex laws . . . is a more satisfying and deeper form of connection or relationship with nature than nonrational or mystical forms of connection, that is, feeling connected to nature but not in a precise and quantitative form” (ID_ N_IT-P-M-N-9154).

Contemplation 5: Above Reason but Not Contrary to It

The previous four kinds of contemplation discussed so far do not require us to entirely give up the image of science as a rational and empirical enterprise. For these kinds of contemplation only require the scientist to exercise their imagination (based on sense perceptions), reason, or both to contemplate. The fifth kind of contemplation brings scientists beyond the empirical and rational domains. For it requires them to contemplate mysteries—things that are above reason and not entirely graspable through reason. In doing so, the scientist is no longer simply seeing nature as it is perceived nor engaging in a vision of the intelligible principles underlying the natural world. Rather, one is taking science as the point of departure to speculate what might lie beyond the visible world and what we can reasonably understand as humans brings.

Many religious scientists engage in this kind of contemplation. Especially for those with theistic commitments, the study of the natural world often leads to the recognition that nature points to the existence of mysteries above reason. As one Italian physicist said, “[I]f you really put hands on cosmology, on some aspects of quantum mechanics, you understand that you need to open up your mind beyond your ordinary, materialistic way of reasoning. You have to embrace other ways of thinking that at the beginning almost shock you because they hurt your little reason” (ID_ RS_IT-B-M-RS-SB1). For religious scientists, the contemplation of “the unreasonable effectiveness of mathematics in the natural sciences,” in Eugene Wigner’s famous phrase, can also point toward a divine creator or designer, as for one British physicist:

Moments such as these, where I saw what once seemed complex then modelled with such simplicity struck deep to my heart, testifying to me that there was a great order to the universe. The more we study physics, the more it seems clear that mathematics is the language of the universe. How remarkable: the language of the universe is logic, not chaos! We live in a perceivable and comprehensible universe! The universe was not created by random chance alone; it was created with purpose and design. As I study it, I come closer to the designer. (ID_ RS_US-P-M-RS-23324)

One would expect that the contemplation of things beyond reason might primarily be found amongst religious scientists. But surprisingly this is not

the case. Spiritual but not religious scientists as well as nonreligious and nonspiritual scientists were found to be engaging in this kind of speculation. One nonreligious Italian physicist recognized that encounter with mysteries in physics brings many “epiphanic moments in his life”: “These moments are brief, and I come to the conclusion and recognize why I got there. I recognize the path. Something similar happens in my work, in physics . . . it is ‘mystery.’ Physics means dealing with mysteries every day” (ID_N_IT-P-M-N-9154).

However, not all scientists find such experience easy to recognize and affirm. One nonreligious American biologist was apprehensive about such experiences. He said: “[I]t does sometimes feel like I am experiencing something beyond me, something beyond my full understanding of it. I’m still viewing it through a sense of what I see things like as a scientist. But I don’t discredit that sometimes it feels a powerful sense of seeing something beyond what I as an individual am able to comprehend. So, I think that there is some of that, but I don’t know if that’s that or not” (ID_N_US-B-M-SBNR-20214).

Contemplation of things beyond reason seems to be a more common experience amongst physicists than biologists. One spiritual but not religious American physicist brought this tension to the fore:

Biology is great, but if you’re studying biology, you’re studying like just how life happens to exist on the planet Earth at this time, with this particular contingent set of historical, evolutionary biochemical processes, and biological truths on Earth are gonna be different from if there is, I imagine there’s biology going on on other planets. But they are enzymes and cells and morphology, and everything is gonna be different from that on Earth. So to me, I think what I love about the physical sciences is that you are truly discovering timeless, eternal truths. (ID_SBNR_US-P-M-SBNR-21514)

Statements like this raise the question of whether physics as a discipline is more open in its epistemological practice to things beyond reason than biology. Might physics in practice demand the scientist to engage in contemplation of intellectible things more than biology? This is a question that deserves further investigation.

Discussion and Conclusion

The objective of this study was to provide an empirical approach to shed light on what contemplation might look like in the context of contemporary natural sciences. The most important insight that emerged from the analysis is that contemplation in the natural sciences should be approached as a multifaceted phenomenon. The six-fold classification of contemplation is a useful heuristic for distinguishing between different kinds of “epistemological beholding” in relation to the objects of scientific research amongst biologist and physicists. The upshot is that contemplation cannot be simplistically assumed to be associated

with the natural sciences as a single phenomenon. Instead, contemplation needs to be framed in the scientific context as a set of interrelated experiences emerging from specific scientific domains (e.g., experimental microscope work, field work, mathematical modelling, etc.). The advantage of the heuristic framework used in this study is that it already positions the researcher to anticipate a variety of modes of contemplative experiences in the natural scientific context.

Looking at scientific practice as involving multiple modes of contemplation also opens up a richer account of what the knowledge creation process in the natural sciences involves. Biology, physics, ecology, and such likes are all “scientific” disciplines, but each involves the scientist in a distinct form of beholding. Scientists engaging with a direct observation of nature in some way—astronomy, ecology, cell biology, and so on—tend to report direct contemplation of a specific thing in the sense-perceptible world: plants, the stars, cells, and so on. Whereas theoretical physicists who work with mathematical models tend to engage in the contemplation of intelligible ideas—what is invisible and graspable by the human mind through reason, e.g., the universal laws for pendulum, the causal structure underlying motion, and so on. In light of this, attempts to theorize a shift from the contemplative to the ergetic ideal of knowledge in modern science will need to provide a multidimensional account of the relationship between contemplation and the individual sciences.

This study also indicates that contemplation may well possess the potential to cut across religious and nonreligious groupings. It is somewhat surprising yet intriguing that religious and nonreligious scientists alike report engagement in contemplation beyond the first four kinds of contemplation in our framework. According to Richard of St. Victor (*Benjamin Major* I.7, 1957, 146), the first four kinds of contemplation engage with that which is created, whereas the final two kinds engage with that which is uncreated. Outside a rigid Christian theological framework, however, we can interpret this result as follows: religious and nonreligious scientists alike can engage in contemplation in scientific work that leads them to speculations that go beyond the scope of human reasoning about the world. Mysteries in nature, perhaps, are available for the religious and nonreligious alike to contemplate.

Lastly, the entire absence of relevant reports related to the sixth mode of contemplation in our heuristic is worth further exploration. It is perhaps unsurprising that contemplation involving a complete breakdown of reason that leads to engagement with things contrary to reason is entirely absent in scientific inquiry. This might be interpreted as suggesting that contemplative-like experiences in the natural sciences do not entirely overlap with contemplation in more traditional spiritual settings. In the latter, the beholding that leads to a breakdown of reason involves contemplation of the highest mystery in the Christian experience, i.e., the trinity. Might something analogous be

conceivable in a natural-scientific setting?¹³ This is an open question, and future research in this direction could provide a more precise account of the differences between contemplation in a scientific setting and contemplation in traditional spiritual settings.

Methodologically, the foregoing analysis illustrates the strength of an epistemologically and cognitively orientated framework for defining contemplation in the natural sciences. Such an approach is useful because to bridge the gap between the vocabulary of contemplation in historical sources and the data collected from in-depth interviews, it is important that the theoretical framework for defining contemplation (1) is not overly tradition-specific in its vocabulary to maintain easy translatability for empirical studies, and (2) offers a distinctive understanding of what contemplation involves that is intelligible in a scientific domain. Richard of St. Victor's framework fits both of these criteria, which explains why it is a useful heuristic for the kind of empirical approach undertaken here.

There are two major methodological limitations in the approach undertaken in this article. The first is related to the nature of the kind of data used in the qualitative analysis. In this study, I have relied entirely on the self-reflection and descriptions of the scientists interviewed with respect to the nature of what I have interpreted as kinds of contemplation in science. These reports, however, might not be accurate or sufficiently precise as empirical evidence of the quality of contemplation actually practiced by these interviewees in their day-to-day activities. Nor should we be uncritical in supposing that what has been reported by the scientists in the interviews is coextensive to the totality of contemplative-like practices or experiences present in their scientific work.

A key example illustrates the significance of this methodological limitation. By relying on self-reporting and interviews, it is difficult to check if the reported experiences analyzed truly resemble contemplation rather than meditation, an important distinction.¹⁴ This raises further questions, such as: How do thinking and meditation relate to contemplation in the scientific life? Do different scientists, depending on their professional experience, progressively ascent from one kind of contemplative nature to another? Or do scientists tend to experience only one kind of contemplation due to the specific nature of their scientific work? Addressing these specific questions within the context of scientific practice—and thereby distinguish between contemplation and meditation—would require a longitudinal study that tracks scientists' lives across a significant period of time. This limitation is an inherent design feature of the *Spiritual Yearning in Science* project and not a restriction on the range of possible analyses enabled by the heuristic proposed here. A sociological study designed to investigate contemplation-like experiences in scientists might make use of this heuristic to create interview guides that can probe more deeply into the range of experiences.

The second major limitation is theoretical and relates to the heuristic used in the analysis (Table 1). I have suggested that in order to speak intelligibly of contemplation in the natural sciences, it is necessary to propose a method that can bridge the gap between the vocabulary of contemplation, normally situated within the context of spirituality and philosophy, and the context of contemporary scientific research. Such a heuristic is important to make contemplation a recognizable phenomenon in reports of scientific experience in the data. For this article, I chose Richard of St. Victor's epistemologically and cognitively orientated approach to contemplation as a guide for data analysis, on the grounds that this framework could be straightforwardly applied to sociological data. Of course, this is not a universal framework for defining contemplation, as there are other frameworks both within the ancient Greek and Christian traditions as well as outside the intellectual setting that underlies the heuristic used in this article. Furthermore, it can be disputed how much the experiences identified in the analysis are truly contemplative, given the narrowly epistemological and cognitive focus in the heuristic used to guide the analysis. These are indeed significant limitations. But they do not take away the usefulness of this heuristic for bridging the gap between the traditional vocabulary of contemplation and the empirical data reported in a sociological study of scientific experience. A more sophisticated approach would require data from studies with a methodology designed to probe deeper into the first-person phenomenological experiences of scientists doing research. Such depth in the data is needed to apply more sophisticated frameworks from different world contemplative traditions.

In conclusion, do natural scientists contemplate? This article has attempted to offer a preliminary empirical approach to address this question. More work will need to be done to establish a more rigorous methodological bridge between the study of contemplation and the sociological study of scientists. There is a fertile field to be opened up here between the two bodies of scholarship. This article developed one empirical approach to open up this field, which is offered to stimulate further empirical studies of contemplation in the natural sciences. Future research should consider different epistemologically and cognitively orientated approaches to contemplation in the theoretical literature. Different institutional contexts (e.g., university versus industrial companies), spaces (e.g., laboratory-based research versus field research versus desk-based data analysis), and seniority (teaching-free research fellowship versus principal investigators) affect the possibility of contemplative activity being incorporated in future analyses to shed light on the (un)favorable conditions for contemplative activity in a natural-scientific context. Larger datasets, inclusion of a wider range of disciplines, or even ethnographical studies could further widen the empirical basis for considering contemplation as a scientific practice. Moreover, this preliminary study should stimulate further debates on

how to measure contemplation in a scientific context based on more complex theoretical tools from different contemplative traditions. Engagement with the methodology in the growing field of contemplative studies (Komjathy 2017) could open up promising avenues. A more systematic direction should consider translating contemplation as a spiritual and philosophical practice into various measurable components (e.g., absorption; Luhrmann et al. 2010) that can be studied through well-established and validated social-scientific methods. Doing so will enable even greater translatability between the definition of contemplation understood in theoretical sources and by spiritual practitioners on the one hand and what relevant empirical data one can bring to bear via existing social scientific methods on the other. It is only by closing this gap that a fully empirical approach can be established for assessing whether natural scientists indeed can be said to contemplate.

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Notes

- ¹ Etymologically, *θεωρία* is derived from *θεωρεῖν*, which spans a range of meanings related to sight: to consider, look at, behold, observe, perceive, speculate (Hart 2024, 26–27). See the entry in the Liddle-Scott-Jones Ancient Greek Lexicon: <https://logeion.uchicago.edu/θεωρία> (accessed November 12, 2025).
- ² McLeish (1962–2023) was a professor of natural philosophy at the University of York and a fellow of the Royal Society. He was previously pro-vice-chancellor for research at the University of Durham (2008–14) and chair of the Royal Society’s Education Committee (2015–20).
- ³ McLeish saw this description from George Steiner, who attributes this reconciliatory function essentially to art. McLeish argues that a recovery of science as a contemplative activity will allow us to see that it can (and must) play a role analogous to the one Steiner attributes to the arts.
- ⁴ The framework used here is not comprehensive because it does not take into consideration the stages of progress from cognition to meditation before reaching perfection in contemplation (see note viii). A more comprehensive description of contemplation would take this progression into account in the data analysis, but this falls outside of the scope of this research. Other approaches to contemplation are certainly available both within the Christian tradition (e.g., Thomas Aquinas; see van Nieuwenhove 2021; Hart 2024) and in other religious traditions (Komjathy 2015). It would be instructive to conduct further research comparing which of these models better fits with scientific experiences reported by contemporary scientists.
- ⁵ By heuristic, I mean a research tool that can be used to undertake preliminary qualitative analysis without first having been subjected to a rigorous procedure of validation—a standard requirement in the social sciences to confirm the quality of a research tool for its intended purposes.
- ⁶ This framework was developed by Richard of St. Victor in two treatises, in the latter parts of *Benjamin Minor*, and primarily in *Benjamin Major*. In this pair of works, Richard applies the premodern technique of “spiritual” exegesis (e.g., allegorical or tropological senses) to the story of Jacob and his clan.
- ⁷ It is difficult to provide a scientific example here, so I list the standard theological example provided by Richard here. While this is controversial, one could conceivably imagine the following statement regarding quantum physics could belong to this level: “beholding the reality that at the quantum level, an electron display both wave (non-localised) and particle (localised) features.”
- ⁸ It is important to point out that in this article, I do not analyze the wholistic process that springs from thinking to meditation to contemplation central to Richard’s account of contemplation. For this distinction, see *Benjamin Major* I.3–4 in Richard of St. Victor (1957, 136–39). The precise distinction made by Richard between *cogitatio*, *meditation*, and *contemplatio* is important but falls outside the scope of this article. This is because our empirical data do not provide the fine-grained details to sufficiently distinguish these different modes of cognition. In section five, I suggest how we might bypass this methodological limitation in future studies.
- ⁹ *Spiritual Yearning in Science* (2024–26) is a sociology of science project led by Brandon Vaidyanathan and delivered by a team of seven sociologists and one philosophical theologian. The author is part of the team and has access to the data. While being thoroughly involved in the methodological discussion on the design of the interview guide and subsequent refinements, I have not conducted any interviews myself. The project is funded by the John Templeton Foundation. For full details of the methodology in this study, including participant recruitment, interview methodology, and demography of participants, see Benedetta Nicoli, Stefano Sbalchiero, and Brandon Vaidyanathan (2025, sec. 3).
- ¹⁰ Work And Well-Being In Science: An International Study (2020–23). For further information, see: <https://workandwellbeingstudy.com> (accessed 14 November 2025).

- ¹¹ In this section, the ID of the interviewee is composed of the country (United States, United Kingdom, Italy, India), discipline (biology or physics), gender (female, male, or other), spiritual identification (SBNR—spiritual but not religious; N—neither religious nor spiritual; RS—religious and spiritual; RNS—religious but not spiritual), and a unique code.
- ¹² We have an apt historical example of this in the development of early quantum theory, when a cluster of explained experimental phenomena (black-body radiation, photoelectric effect, and Compton scattering) were suddenly interconnected through the energy transition rules emerging from the Bohr atomic model. In this case, contemplation of an abstract heuristic (as it turns out) that is purely an idea helps account for the apparent chaos in our encounter with subatomic phenomena.
- ¹³ The significance of the lack of overlap between “contemplative-like” experiences in a natural-scientific context and the sixth mode of contemplation in a purely religious setting deserves further attention. For this observation might shed greater light on the nature of contemplation, especially on why we do not typically think of scientific activity as contemplation. This might be because we tend to think of contemplation as comprising purely Richard of St. Victor’s sixth (maybe also fifth) mode of contemplation. Perhaps it is worth developing a precise distinction between the aspects of contemplation that could be found in principle in both scientific and spiritual-religious activities and the aspects of contemplation that in principle could be found only in a spiritual-religious context. I thank an anonymous reviewer for drawing my attention to this issue.
- ¹⁴ In the context of Richard of St. Victor’s (*Benjamin Major* I.3–4, 1957, 136–39) understanding, meditation is like marching, focused on one thing, toil-ful, and progresses incrementally, whereas contemplation is like free flight, shedding a single light on innumerable things, effortless, and spontaneous. To distinguish between the two in the data, the research subjects (i.e., natural scientists) would have needed to attend to the subjective quality of how a scientific experience came to them and intentionally report one or the other. Since the Spiritual Yearning in Science study was not primarily a study on meditation and contemplation in natural scientists, the project did not generate systematic data that capture the differences between the two.

Competing Interests

The author declares that they have no competing interests.

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From Reason to Revelation: Scientists' Experiences of the Transcendent

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This article examines how scientists engage with and describe transcendent experiences, drawing on a diverse range of perspectives that includes the religious, the spiritual, and “nones.” Through a quantitative-qualitative analysis of interviews, the article identifies both the contents and modalities of such experiences, ranging from moments of awe in nature or scientific discovery to sensations of unity or deep meaning. It also considers how frequently these experiences are reported across different identity groups and investigates the contexts in which they emerge, whether within scientific practice, personal reflection, or encounters with the unknown. The findings reveal how the language of transcendence is articulated within the scientific community and how it navigates the boundaries between empirical enquiry and existential reflection.



Introduction

There are notable similarities between scientific and religious belief systems. In complementary ways, both seek a human—that is, rational—way to experience and engage with the mysteries at or even beyond the edges of the natural, sensory world as it is. Moreover, many scientists approach their work as they would a religion, adopting both the good and bad of structured systems of belief (Maslow 1965). Whilst some have traditionally resisted such analogy, others have made it an explicit confluence, arguing that transcendence, the “elevation or extension beyond ordinary limits” (*Oxford English Dictionary*, n.d., under “transcendence”), is what keeps both science and religion seeking not only answers but also more, deeper questions (Heller 1997; Nicoli, Sbalchiero, and Vaidyanathan 2025a, 2025b).

The transcendent sense of wonder, then, emerges as a critical theme in understanding whether and how science and religion can coexist. The ancient Greek philosophers saw wonder as the starting point for all enquiry (Aristotle 2001, 982b; Plato 1988, 155d). Wonder, historically associated with active curiosity and enquiry, serves as a guiding force—with links to personality, emotion, and wellbeing (Jacobi et al. 2022; Varga et al. 2023)—in helping individuals pursue new knowledge and fill existing gaps by fueling individual yearning and deliberate searching for unknown information, especially in the presence of feelings of interest and deprivation (Kashdan et al. 2018; Ryakhovskaya et al. 2022; Valdesolo et al. 2017).

From the Enlightenment onward, the image of the scientist became increasingly entangled with broader processes of rationalization in Western modernity. Max Weber (2004, 12–17) famously described modernity as marked by “disenchantment,” a condition in which the world becomes calculable and subject to technical control rather than sacred mystery. Within this framework, science emerged not merely as a method of enquiry but as a paradigmatic expression of rationalization itself, privileging formal coherence, empirical verification, and methodological discipline over metaphysical speculation. This intellectual trajectory was further reinforced in the early twentieth century by logical empiricism. Hans Reichenbach (1956) articulated a vision of scientific philosophy grounded in logical clarity and empirical testability, explicitly distancing scientific knowledge from metaphysical and theological claims. In such accounts, the separation of science and such “aesthetic” notions of wonder were increasingly separated in the pursuit of pure rationalism (Reichenbach 1956), leading to the endurance of the image of the scientist who is as purely rational and secular as his¹ scientific instruments. More broadly, Charles Taylor (2007, 539–93) describes contemporary Western societies as inhabiting a “disenchanted age,” in which belief in transcendence is no longer socially axiomatic but has become one option among others within what he terms the “immanent frame.” Science, in this context, functions as a central institution of that immanent

frame, symbolizing epistemic restraint and methodological naturalism. As a result, the modern scientist is frequently imagined as the emblem of secular rationality: analytical, objective, and detached from transcendent commitments (Weber 2004; Taylor 2007).

This historical consolidation of science and rationalization has shaped enduring expectations about the relationship between scientific practice and transcendence. If science is institutionally aligned with disenchantment, then transcendent experience appears, at least *prima facie*, to stand in tension with scientific enquiry. It is precisely this assumed tension that our study seeks to examine empirically. Rather than presupposing either conflict or integration, we investigate how scientists themselves articulate experiences they describe as transcendent and how these accounts interact with inherited narratives of secularization and rationalization.

After this historical consolidation of science and rationalization, modern science continues to be widely perceived as a rational, methodical, analytical, and objective endeavor, characteristically devoid of spiritual overtones and resistant to emotion, aesthetics, and transcendence (Gane 2004; Weber 2004, 12). The ideal of scientific objectivity, which underpins the legitimacy of science, privileges scientific claims that are “untainted” by personal beliefs, values, and interests (Reiss and Sprenger 2020; Yamamoto 2012). Discussions of the institutional imperatives that govern modern academic science (Merton 1973) as well as empirical research on public perceptions of scientists (B. B. Johnson and Dieckmann 2020; Long and Steinke 1996; Weingart et al. 2003) often suggest a mode of operation bereft of personal commitments or emotional—let alone transcendent—experiences. Such perceptions have even led in some cases to an intuitive bias stereotyping scientists as valuing knowledge over morality (Rutjens and Heine 2016). Science, and the scientist,” are therefore typically perceived to be among the vanguard of what many have described as a rising tide of secularization within a broader disenchanted age (Nicoli, Sbalchiero, and Vaidyanathan 2025a; Taylor 2007).

By turning the very same “secularizing” methodical and analytical lens on modern scientists themselves, however, a more nuanced picture emerges. Scientists can and do express and engage with affect and aesthetics in their work (Jacobi et al. 2024), and they also endorse forms of spirituality and resonate with ideas of enchantment (Nicoli, Sbalchiero, and Vaidyanathan 2025b). Many even readily identify as formally religious (Ecklund et al. 2019). Scientists are thus an understudied but important (perhaps the most important) population in which to study the manifold interactions of the supposedly “secularizing wave” of science with the complex human religious and moral convictions of the individuals whose experiences of the transcendent cut across the religious, spiritual, and “nones” alike (Vernon 1968; Silver et al. 2014; Van Mulukom et al. 2023).

Much of the literature has treated science and spirituality as separate, even antagonistic, domains. Responding to this observation, Thomas F. Gieryn (1983) coined the term “boundary work” to describe how scientists demarcate science from nonscience to protect epistemic authority. We propose a more complex form of boundary work wherein scientists combine rather than strictly separate scientific and spiritual spheres. Within this framework, moments of transcendence do not simply negotiate lines of separation; they create hybrid spaces where empirical reasoning and existential reflection coexist. Deepening this insight, Sorrell and Ecklund (2019) explore how scientists legitimize both science and religion through dynamic boundary strategies. Other researchers have demonstrated that whilst analytic thinking can diminish religious belief (Shenhav et al. 2012; Gervais and Norenzayan 2012), self-transcendent affective experiences in response to awe-inspiring science content can increase belief in God (Johnson et al. 2019a), just as calling to mind spiritual experiences can evoke awe in the religious and nonreligious alike (Preston and Shin 2017). More recently, Khalsa and colleagues (2022) showed how sacred and secular realms overlap in scientific settings, while Bigliardi (2023) has examined how many new religious movements co-opt aspects of science and scientific language, complicating binary distinctions. Boundary work in this context suggests that transcendence among scientists is not reducible to either secular rationality or religious tradition but often emerges in their interplay.

An important distinction for our framework is between awe and wonder. Awe (as aesthetic affect) is a receptive state characterized by the perception of vastness, the need for accommodation, and accompanying feelings of humility and smallness of self that might overwhelm rather than stimulate analytic searching (Keltner and Haidt 2003; Keltner 2023). Wonder (as epistemic cognition) is an active stance of enquiry and engagement fueled by the desire to understand (Keil 2022; Darbor et al. 2016), often in response to stimuli defying accommodation. Underscoring the diverse ways transcendence can be articulated (Darbor et al. 2016), awe and wonder respectively account for encounter and enlightenment, the aesthetic and epistemic, and the affective and cognitive aspects of transcendent experiences, just as transcendence itself is best conceived as an umbrella experiential category that can be accessed through either or both of these modalities depending on the content and context of the experience (Varga 2021).

Contemporary discussions reinforce the distinction: while awe can inspire transcendence through emotional intensity, wonder and its related states (e.g., curiosity) function as ongoing epistemic drivers of exploration and meaning-making (Kashdan et al. 2018; Ryakhovskaya et al. 2022; Jacobi et al. 2024; Valdesolo et al. 2017). In other words, awe is concerned with observing and experiencing the world, and wonder is related to understanding it (Darbor et al. 2016; Keil 2022). As Petersen (2025) observes, scientific contexts often skew

toward wonder, framing it as a motivating force for conservation, poetics, or ritual, while awe remains underexplored in these same contexts. We argue that awe appears to be especially implicated in scientific work, where it has been associated with interest in science and spirituality of science as well as associated scientific learning, meaningfulness, and wellbeing (Preston et al. 2023; Varga et al. 2023; Cuzzolino 2021; Valdesolo et al. 2017, 2016). Recognizing awe and wonder as distinct but interrelated constructs allows us to clarify how scientists describe transcendence: sometimes as a sudden, overwhelming affective rupture (awe), and at other times as a sustained, inquisitive engagement with mystery (wonder).

We propose that the contrast between a more active, approach-motivated wonder that gives way to awe and passive contemplation (McDougall 1921; Darbor et al. 2016) reveals much about the dynamics and modalities of transcendence more generally. Scientific practice is frequently associated with active, methodical analysis: careful observation, measurement, and explanation. Yet, thus far overlooked in the literature is a passive, meditative dimension—moments when methodical observation gives way to contemplation, absorption, or surrender. Consistent with the aforementioned distinction of wonder and awe, this contrast has precedents in the Thomistic distinctions between the discursive (reasoning) and contemplative (intuitive) modes of knowing (Aquinas 2018) and the Kantian distinction of beauty and sublimity (Kant 2000). It can also be found in early theories of epistemic emotion (McDougall 1921) and the psychological differentiation of extrovertive and introvertive types of mystical experience (Hood 1975). The relationship between these two modalities for scientists is not oppositional but cyclical: active analysis can unexpectedly open into meditative contemplation, and contemplative states may inspire renewed analytic focus. Recognizing this dialectic is crucial for capturing how transcendence manifests within empirical enquiry. This resonates with Williams's (2023) analysis of attention, which he conceptualizes not as a purely active focus but as a negotiated process between perceiver and environment. Such an approach highlights how contemplative absorption can emerge precisely from the suspension of methodical analysis, thereby reinforcing the cyclical interplay between analytic effort and meditative receptivity.

This raises the question of whether contemplation is inherently religious or whether it can also be secular—or even something else entirely. Some scientists describe contemplative states in explicitly secular terms, while others employ mystical or spiritual language. The very ambiguity of contemplative discourse highlights its polyvalence: it can signify devotion to the divine, but it can equally describe immersion in scientific practice or artistic beauty. Taken together, these perspectives allow us to frame this study not only as descriptive but also as a theoretical contribution to ongoing debates about “higher experiences.” By identifying how awe, wonder, contemplation, and boundary work intersect in scientists' accounts, we situate our findings within a broader conversation about transcendence as a human category. The present study thus offers conceptual

thickening by clarifying the mechanisms through which such experiences are reported and interpreted. For the scientists in our study, as we will see later, transcendence often arises precisely at the intersection of explanatory clarity and existential openness.

The Present Study

The primary research question driving this study is: How does transcendence fit within the broader context of scientific enquiry and experience? The relationship between science and transcendence is complex and often contested (Heller 1997; Maslow 1965). On one hand, science is frequently seen as a rational, empirical endeavor that leaves little room for the ineffable or the transcendent. Yet, on the other hand, the very act of scientific discovery—of probing the deepest mysteries of the universe, life, and consciousness—can evoke a profound sense of wonder, awe, and even transcendence. This raises a critical tension: Does science suppress transcendence, or does it, in fact, stimulate it through the experiences it generates? Scientific enquiry often produces what might be called a “surplus of meaning” (Pace 2011): discoveries that not only explain but also inspire, pushing the boundaries of human understanding and inviting deeper reflection. Moreover, we must ask whether science can offer a meaningful framework for interpreting transcendence, one that allows individuals to engage with it, whether or not they connect it to religious or spiritual traditions. Could this surplus open new pathways for contemplating transcendence, even within a rigorously empirical worldview? This article explores these questions within a sociological framework, distinguishing among the “religious” (i.e., belonging to a formally organized system or community of belief), “religious but not spiritual” (e.g., “culturally” religious), “spiritual but not religious” (e.g., not participating in organized religious practice), and “neither religious nor spiritual” (i.e., having no religious or spiritual affiliation or affinity) as identified in both preliminary surveys and interviews with scientists. The present study thus explores how science, and the beliefs of scientists, might both constrain and enable transcendent experiences and whether science itself can serve as a bridge between empirical knowledge and the timeless human search for meaning.

Data and Methods

Data were collected from an international study² comprised of 104 in-depth interviews, conducted between November 2023 to May 2024, with biologists and physicists across four countries: India, Italy, the United Kingdom, and the United States. These two scientific disciplines were chosen because they seem to access and evoke transcendence in complementary ways. As Ben D. MacArthur (2021, 150) puts it, “while the physicist may see beauty in simplicity, the biologist may see beauty in interconnection, mutuality and complexity.” Similarly, the physicist might experience transcendence in questions of

cosmology, fundamental laws, and the nature of reality just as the biologist might experience transcendence in complexity, life processes, and evolutionary narratives. These different perspectives provide a more diverse overview of the two main ways into understanding aesthetic and epistemic considerations in scientists' transcendent experiences.

To minimize potential bias, the recruitment materials framed the research as an investigation into “the deeper motivations behind scientific work, the experiences scientists find most meaningful, and the challenges they face in achieving fulfilment and connection in their professional and personal lives.” Notably, the term “transcendence” was deliberately omitted to prevent preconceived associations from influencing participation. During the interviews, which lasted between sixty and ninety minutes, participants were guided through reflections on their experiences of connection, or disconnection, with nature, self, others, and any sense of a higher power or divine presence. The discussion also explored themes such as spiritual longing, (dis)enchantment with science, encounters with mystery, and the pursuit of meaning. Rather than focusing on abstract beliefs, the interviewers prioritized concrete narratives, inviting participants to share personal anecdotes that illustrated these dimensions of their lives. Demographic details of the interview sample, including an interviewer-assessed “spiritual identification,” are provided in Table 1.

Characteristic	N
SPIRITUAL IDENTIFICATION	
Spiritual but not religious	40
Neither religious nor spiritual	29
Religious and spiritual	29
Religious but not spiritual	6
COUNTRY	
India	25
Italy	27
United Kingdom	25
United States	27
DISCIPLINE	
Biology	56
Physics	48
GENDER	
Female	37
Male	66
Non-binary	1
Total	104

Table 1: Demographic overview. Demographic data from the Meaning and Mystery in Science Project.

Spiritual identification was based on how interviewees self-identified during the interview. In some cases, this differed from their earlier survey responses. For analytical consistency, the classifications reported here reflect interview-based identification. Although some variation in spiritual identification appears across national contexts, no single country exclusively drove the thematic clustering identified in the lexical analysis. The patterns observed in the correspondence analysis are distributed across all four countries represented in the sample.

Many respondents identified current or cultural religious affiliations in response to personal history questions. The dataset, however, does not provide collated summary data on religious backgrounds for all respondents. Superficially, there did not seem to be much variation in the way transcendent experiences were discussed, as most of the segments extracted in the present study do not show the use of religion-specific terms.

Our spiritual/religious typology distinguishes four orientations: religious and spiritual (RS), religious but not spiritual (RNS), spiritual but not religious (SBNR), and neither religious nor spiritual (NRNS). Importantly, our data reveal that NRNS is not a homogeneous group; some members resembled SBNR respondents in their openness to transcendent language, while others rejected both religious and spiritual categories altogether. This heterogeneity aligns with Zinnbauer and colleagues (1997), who challenge the conflation of spirituality and religiosity and emphasize the need for analytical clarity in distinguishing these categories. Linda A. Mercadante (2014) further illustrates the internal diversity within SBNR and nonaffiliated groups.

From a methodological point of view, this study employed a two-phase, mixed-methods design, utilizing a sequential exploratory framework (Creswell and Plano Clark 2011) to systematically integrate qualitative and quantitative components. The qualitative phase centered on in-depth interviews (Bryman and Burgess 1994), which, as widely documented in methodological literature (Deterding and Waters 2021; Savin-Baden and Major 2013; Silverman 2006; Strauss and Corbin 1998), frequently yield emergent themes that arise organically rather than in direct response to predetermined questions. A notable characteristic of this dynamic was participants' tendency to introduce topics slated for later discussion early in the conversation, demonstrating the fluid nature of qualitative interviewing and emphasizing the need for methodological adaptability. Consequently, by following verbatim transcription and quality verification, all interview transcripts and accompanying field notes were imported into ATLAS.ti for qualitative analysis. The analytic process involved constant comparative analysis, with researchers moving iteratively between raw interview data, reflective field diaries, and systematic content examination. To manage the substantial qualitative dataset, we implemented a multi-stage coding approach: an initial "broad bucket" coding strategy facilitated the capture of both expected and spontaneously arising themes, while subsequent rounds of analysis refined these categories. This systematic yet flexible approach enabled effective data reduction while preserving the richness

of participants' narratives. Our analysis focuses on the "transcendence" code, a thematic category comprising textual excerpts and narrative passages that referred to transcendent experiences. This code was constructed by capturing respondents' descriptions of moments that surpassed ordinary perception, whether through awe, sudden insight, or profound emotional and cognitive shifts. The lexical patterns within this corpus, as we will see later, reveal recurring keywords (such as "encounter," "wow," "amazing," "sheer," "beauty," "excitement," "joy," "awe," "profound," "aware," "grasp," "insight," and "illumination," among others) that collectively articulate the ineffable yet transformative nature of these experiences, reflecting both the affective intensity (awe, joy) and the epistemic dimension (insight, illumination) of transcendence. The final corpus consists of 581 portions of text labelled with the "transcendence" code, ensuring analytical rigor through systematic categorization while preserving the richness of individual narratives. The 581 coded text segments were distributed across key demographic variables, with female scientists contributing 232 segments and male scientists 349 segments. Geographically, the segments were distributed across all four national contexts: India (93 segments), Italy (123 segments), the United Kingdom (186 segments), and the United States (179 segments). Disciplinary representation showed a similar balance, with biologists contributing 296 segments and physicists 285 segments, reflecting comparable engagement with themes of transcendence across these scientific fields.

Our analysis of the 581 text segments coded as "transcendence" employed computational topic detection to identify latent thematic patterns. We utilized Reinert's (1983) hierarchical classification algorithm as implemented in IRaMuTeQ (Ratinaud 2014), a text analysis software built on the R platform. This method proved particularly effective for revealing what Reinert (1993) conceptualizes as "lexical worlds," i.e., topics with distinct vocabularies that emerge as interpretable latent dimensions within textual data. The analytical process (Sbalchiero 2018) began with preprocessing our corpus of 581 elementary context units: the algorithm first constructed a word-by-unit contingency matrix to map lexical co-occurrences, then performed successive correspondence analyses (Greenacre 2007; Lebart, Morineau, and Warwick 1984) combined with χ^2 -based hierarchical clustering (Reinert 1983) to group elementary context units into semantically coherent topics. For our specific research objectives, we examined how these topics correlated with participants' spiritual identifications. This "who says what" approach allowed us to identify significant associations between particular semantic classes and religious/spiritual orientations through χ^2 -based analysis: if a topic was discussed more by scientists who identified as religious (or spiritual or none), then the positive differences and the threshold for the significance of χ^2 indicated an association between that identification and the topic. The final output organized the textual material into interpretable semantic classes, each characterized by distinctive lexical patterns that we analyzed in relation to their most representative textual excerpts, as discussed in subsequent sections.

that correlates with scientists' self-reported spiritual and religious orientations. In the main factorial plane, Factor 1 captures the principal opposition in lexical distribution and corresponds to statistically significant χ^2 associations with spiritual identification. The left quadrants are predominantly associated with scientists identifying as SBNR or NRNS, whereas the right quadrants are predominantly associated with RS or RNS scientists. The figure thus visualizes the primary dimension of differentiation in the corpus. Factor 2 accounts for substantially less inertia and does not correspond to a stable or theoretically interpretable differentiation across spiritual identification or other demographic variables. For this reason, it is not central to our analysis, which focuses on the principal dimension of opposition represented by Factor 1.

Nonreligious Scientists

The first lexical cluster, predominantly associated (by χ^2 association) with nonreligious orientations (SBNR and NRNS), reveals a distinctive configuration of transcendence grounded in empirical engagement and first-person experiential meaning-making. For example, an Italian physicist, Francesco,³ told us, "I abandoned religion, but I did not abandon the spirituality that is rooted in the universe." These respondents articulate transcendence not as a fixed set of beliefs but as an evolving, deeply personal journey of existential enquiry. Their narratives consistently framed transcendent experiences through the lens of direct engagement with the natural world, using language that emphasizes active searching ("desire," "search," "elsewhere") and embodied awareness ("sense," "connection," "yourself"). Natural observation, encompassing empirical practice and the scientific mindset, thus emerged as an unexpected conduit for transcendent experiences. This phenomenon manifested most vividly in what we might term "empirical awe": those moments where methodological observation unexpectedly transforms into profound epistemic-emotional encounters. Francesco went on to recount:

I often experience this deep connection with the universe as something that transcends us . . . This is something transcendental with respect to the materialistic view that is a requisite for science. I have noticed it both in my research about the infinitely small— I mean work with microscopes that allow us to see molecules or even simply study a cell, visualize it, understand what processes have modified that cell. This leads me to see something more transcendent because I can relate the features of that cell to those of an organ where it has a function, and then the organ in an organism, the organism in an individual which eventually cannot live without a society that therefore we could consider as a superorganism. So seeing all these levels connected to each other leads to a vision that I perceive as transcendent compared to the tiny reality that I am actually observing (IT-P-M-SBNR-8977).⁴

connections are revealed and understood. For example, an Italian biologist, Serafina, told us, “I did two years of preparation for confirmation. I tried hard to believe but couldn’t. Now I don’t feel the need to explore something immaterial, transcendent. I already consider human emotion and human thinking to be transcendent—something that emerges from matter and has an independent meaning, a life of its own. I am not attracted to looking for something more” (IT-B-F-N-6070). Such an approach to the transcendent in science creates a distinctive epistemological position that honors empirical grounding while making space for moments of awe and wonder that arise organically through the observational process itself.

Whilst traditional religious frameworks often ground transcendence in communal rituals and historical revelation (Alcorta and Sosis 2005; Durkheim 1912; Torrance 1994), these scientists articulated transcendence as an emergent property of personal—and scientific—engagement, a distinction that becomes particularly evident when comparing lexical patterns across clusters. “That’s a Spinozian kind of spirituality, very dominated by rationality, by the laws of nature . . . Even if I have a secular vision, I don’t ask myself if God exists or not. I have an ethical law within that leads me to do good, but I don’t have faith in any religion designed by human beings. Yet, in a transcendent entity, I admit we can conceive some entity that transcends our reality . . . I think that there must be a deep connection with something transcendent,” Francesco told us, going on to cite the physicist David Bohm as an example, “He had a very holistic vision of physics that led him to embrace concepts from Vedas, Buddhism, and Hinduism. The idea of consciousness in Hinduism, for example, is very significant for all scientists who are engaged in understanding the origin of consciousness. It makes you realize that it had already grasped some extremely important aspects that researchers are facing today” (IT-P-M-SBNR-8977). As seen in these cases, at the interpretation level, the data reveal a consistent inverse relationship between appeals to institutional authority and references to empirically triggered transcendent experiences, suggesting fundamentally different phenomenological foundations for transcendence across these groups. Among nonreligious scientists, references to transcendence often drew—sometimes implicitly—on ancient traditions. One respondent cited Vedic and Buddhist concepts when reflecting on consciousness, noting how these traditions anticipated issues modern science continues to confront. This suggests that even self-identified secular scientists may reproduce patterns of thought shaped by ancient religious and philosophical cultures, whether consciously or not.

In this regard, the thematic cluster correlating with nonreligious scientists also reveals a nuanced phenomenology of transcendence that occupies a conceptual middle ground between spiritual frameworks and secular scientific rationality by articulating an aspect of transcendence that emerges through empirical

engagement with the natural world. Central to these accounts is what we can term contemplative empiricism, a paradoxical fusion of methodical observation and meditative awareness. Scientists described how specific natural places, for example, become sites of revelation where routine research unexpectedly deepens into transcendent experience. Hashir, a British physicist, told us:

When you're at the telescopes, it's an amazing environment . . . These places you go to, I mean, Hawai'i or the Canary Islands or Chile, they are these incredible places. And it's the sheer physical beauty, I think you would say, immediately that hits you. And then there's the beauty of the night sky because it's completely unpolluted . . . You go there and you see the Milky Way and all the various other phenomena . . . When I'm there I really try to immerse myself in the physical environment. So, not just the nighttime environment and not just the telescope environment, but I really try to get out and explore and really get a sense of being in one specific place on Earth. Which is somewhat ironic because work is about looking completely away from Earth. But for me, that's kind of an important part. So I am vaguely involved in some space telescope instrumentation. But for me, it doesn't hold nearly as much excitement or joy. And it's more of a technical procedure to go through. (UK-P-M-SBNR-15587)

Others, such as Harvey, compared transcendent experiences in their scientific work to striking encounters with natural world:

The causal correlation between this thing—this electron in diamond—it's a nanoscale little thing that has a photon that comes out, and that photon goes through an optical path, and then that hits a diode. That diode sends a signal into an intellect digital converter, and that goes into my computer, that then goes into my monitor, that goes into my eye. And that's just like, in the same way that I think when someone sees a beautiful mountain or something like that—it's truly transcendent in that way sometimes. (US-P-M-RS-23869)

Recurrent references like these to specific “landscapes,” “sites,” or “observations” tied to vivid geographic or sensory details and, moreover, the paradoxical language that is simultaneously scientific (e.g., “measurement,” “data”) and contemplative (e.g., “wonderful,” “pause”) underline this cluster's hybrid nature, which is neither fully secular nor traditionally religious. Nisha, an Indian biologist, gave this example: “I want the things I cannot explain or the fact when you're just sitting on a rock and you're surrounded by all these little buzzy moving things. This is so intense. I like that. And that feels to me, very sort of transcendent. And I like landscapes . . . We choose our landscapes to study. I do, that are not complex forest. That's overwhelming to me. I like ecosystems that are open and vast. And so, rocky hills where I can sit on top

of a hill and like see forever. That feels very amazing. And that to me feels very connected to this broader, incredible natural world” (IN-B-F-N-1849). This duality suggests a liminal space where scientific rigor and existential reflection can coexist.

The language of these narratives oscillates revealingly between registers. For example, Farhad, a British physicist, told us, “When I’m sitting there observing the thing that I’m researching—that’s when I really feel that connection to nature. And I feel like, wow, the vastness of nature almost gives me that motivation to carry on my research” (UK-P-M-SBNR-14815). This discursive tension mirrors scientists’ lived reality as both rigorous researchers and awestruck observers. What emerges is neither conventional religious transcendence (mediated through doctrine) nor purely secular empiricism but rather what might be called an empirical sublime, where the very practice of scientific observation, or the encounter with art and beauty, becomes a gateway to existential reflection.

This hybrid positioning became particularly evident in the scientists’ descriptions of temporality during transcendent moments, even extending beyond the scientific context: the world pausing as a landscape revealed deeper meaning, or hours dissolving during a particularly engrossing observation, or when music or art become drivers opening the way to transcendent thought. As, Elliot, described, “I do think probably in my life the most common time when I do feel sort of a transcendent kind of feeling is often in music—if I’m singing, performing. Sometimes an encounter with a work of art, which could be visual art in a museum or could be reading a novel or something. To me, I think I find those transcendent moments come more often in connection with artistic endeavors” (US-P-M-SBNR-21514).

Religious Scientists

The second lexical cluster, predominantly associated with religious orientations (RS and RNS), presents a distinct configuration in which transcendence is articulated within, and often negotiated through, communal faith traditions. These individuals articulated transcendence through a unique integration of faith and scientific worldview, where terms like “transcendence,” “spiritual,” and “religious” consistently appeared alongside “knowledge,” “beauty,” and “awareness” but also in tension with “scientific progress,” “faith,” and conceptual “distinctions” between domains. Two Italian scientists interviewed together, Benedetto (a biologist) and Carlo (a physicist), cited agreement with Werner Heisenberg on the relationship between science and transcendence: “I think that a real scientist is open to the transcendent. Why? Because science moves you away from reality” (IT-B-M-RS-SB1). Others offered different perspectives. For example, Sani: “I won’t say it is God, but maybe some kind of higher authority or power exists—one that guides you always. It’s not just during research or intellectual pursuits; this presence is always above you,

I think is kind of self-evident in the reason why I said it was good, because it's like I'm spreading out my tendrils out into the universe" (US-P-M-RS-23324), whilst Pavel identified an almost spiritual "yearning" for "sort of progress in my understanding of what is going on, first of all. Because I mean, I'm, as a scientific worker, as a writer, I mean, for me, the most important thing is just progress, constant progress towards understanding. And that's why this is a major thing which makes me happy" (UK-P-M-RS-SB5). Crucially, this cluster showed neither the conflict posited by traditional "science versus religion" narratives nor the seamless integration suggested by mystical perspectives but rather a pragmatic "distinction" that allows both systems to coexist on their own terms—a form of negotiated faith.

Italian biologist Feliciano described his approach to this balance: "I certainly recognize the spiritual dimension precisely as a human trait of openness to the transcendent, and an inner dimension of an inner world that is not only the material one. Similarly, the religious dimension relates to codified, shared, and transmitted faith. In this case, I would say that overall, these are two dimensions that together constitute part of a complete human being" (IT-B-M-RS-SB12). American physicist, Harvey, offered a slightly different framework, prioritizing the sensible world but still leaving room for a transcendent spirituality:

I mean, I think that my spirituality . . . I think that sense of spirituality for me is about a sense of wonder and emotional connection with this world, and not, I think about something beyond this. Because to me, at least, supernatural suggests something that either doesn't follow the laws of physics or somehow outside of the realm of comprehensive science or something. And to me, that we can have speculative fiction and imagine other kinds of worlds and those sorts of things, those are much less interesting to me, except as, the reason that I enjoy some kinds of science fiction or fantasy is because of what those stories tell about our real world. Fiction is a great way to explore our world. But what really interests me is our world, and people in our world and stories about our world . . . If to you, aesthetic spirituality means spirituality connected with a sense of transcendence, whatever, within our world, then I think I would sign on for that. (US-P-M-RS-23869)

Whereas Cluster 1 revealed a form of reflexive/contemplative transcendence, Cluster 2 showed that religious scientists frequently describe transcendence as grounded in communal traditions yet open to reinterpretation. Faith provides the initial framework, but scientific work often reshapes how transcendence is understood and articulated. Rather than static categories, religious traditions serve as dynamic resources through which higher experiences are both anchored and reimagined. We refer to this second pattern as negotiated transcendence: a dynamic framework in which scientists variably position spiritual and scientific

domains. Some participants emphasized a strict distinction between the realms of “religion” and “scientific progress,” while others described more permeable boundaries where “beauty” or “awareness” created unexpected intersections. Cluster 2 did not require full integration nor mandate strict separation; rather, it illustrates how individuals actively negotiate these relationships contextually (see Oleynick 2015).

The comparative structure of these two configurations is summarized in Table 2. The table synthesizes the interpretation of the lexical classes across five analytical dimensions: orientation and definition, key characteristics, source of meaning, narrative register, and epistemology.

	Topic 1: Transcendence among non-religious scientists (SBNR and N)	Topic 2: Transcendence among religious scientists (RS and RNS)
Orientation, definition	Transcendence as an evolving and personal experience rooted in empirical awe and direct engagement with nature. Neither purely secular nor traditionally religious (empirical sublime).	Transcendence anchored in faith traditions but pragmatically negotiated with science. “Dual orientation” maintaining separate or interacting realms.
Key Characteristics	- Reflexive/contemplative cycle (observation → transcendence → interpretation) - “Embodied awareness” (“sense,” “connection”) - Resistance to doctrinal systems - Lexical pairs: “nature/desire,” “cosmos/purpose”	- “Negotiated” boundaries between faith and science - Beauty of natural laws as divine order - Lexical pairs: “knowledge/faith,” “beauty/awareness”
Source of Meaning	Scientific practice, artistic encounters, or natural observation as gateways: “When I’m sitting there observing . . . that’s when I really feel that connection to nature” (ID_UK-P-M-SBNR-14815).	Codified religion and cultural traditions: “My understanding evolves . . . with surrounding traditions, culture, religion” (ID_IN-P-M-RS-3748).
Narrative register	Hybrid register: oscillates between scientific (“measurement”) and contemplative (“wonder”). “Paradoxical” (e.g., ID_IT-SV-SS-B-6815) fusion of methodological observation and meditative awareness (contemplative empiricism).	Tension between “scientific progress” and “faith.” Explicitly maintain separate “realms” (ID_US-B-F-N-19025), yet reference “intersections” (ID_US-P-M-RBNS-01), such as beauty as divine order.
Epistemology	First-person experiential meaning-making: transcendence emerges not from received wisdom but from the very act of disciplined looking (reflexive transcendence). “I already consider human emotion and thinking to be transcendent . . . emerging from matter but with independent meaning” (ID_IT-B-F-N-6070).	“Harmony” of empirical and revelatory knowledge: “They are not completely separate; they exist in harmony” (ID_IN-P-M-RS-3748). “A real scientist is open to the transcendent . . . science moves you away from reality” (ID_IT-B-M-RS-SB1).

Table 2: Transcendence among scientists. Qualitative data from the Meaning and Mystery in Science Project.

Among nonreligious scientists (SBNR and NRNS), transcendence was articulated primarily as a first-person experiential process grounded in disciplined empirical engagement. Its defining characteristic is a reflexive cycle in which observation gives rise to heightened awareness, which is then interpreted without recourse to institutional doctrine. The narrative register frequently oscillates between scientific and contemplative language, reflecting what we have described as contemplative empiricism. Epistemologically, transcendence emerges from within empirical practice itself and is framed as an emergent property of engagement with nature rather than as an appeal to inherited authority.

By contrast, among religious scientists (RS and RNS), transcendence was articulated within interpretive frameworks shaped by communal traditions of belief. While scientific practice is not rejected, it is situated alongside religious commitments in either negotiated coexistence or dynamic interaction. Here, transcendence is frequently grounded in references to faith, divine order, or spiritual meaning embedded in natural laws. Epistemologically, empirical and revelatory modes of knowing are positioned in complementary or dialogical relation. This comparison demonstrates that the distinction between the two configurations is not merely lexical but epistemological and phenomenological, reflecting different ways of grounding and interpreting higher experience within scientific life.

Discussion

The analysis reveals two patterned configurations of transcendence structured by differing epistemological orientations rather than by the mere presence or absence of religious affiliation. Among nonreligious scientists (SBNR and NRNS), we observe a form of reflexive or contemplative transcendence predominantly grounded in first-person experience. A hallmark instance of this configuration is what we have termed empirical awe—the shift from disciplined methodological observation to a profound epistemic-emotional encounter or insight. The mechanism underlying such experiences may be described as contemplative empiricism: a meditative quality of sustained observation that gives rise to reflective and reflexive moments of heightened meaning, sometimes experienced as what might be called the “empirical sublime.” Here, transcendence is not imported from outside scientific practice but emerges from within its disciplined procedures.

By contrast, among religious scientists (RS and RNS), transcendent experiences more frequently take the form of negotiated transcendence, arising through interaction with communal traditions of belief. The mechanism at work here may be described as negotiated faith, in which science and religion are positioned either in respectful distinction or in dynamic coexistence through more permeable boundaries. Some religious traditions are more open to this

kind of empirical integration than others, and this was perhaps reflected in part by some interviewees' responses to our prompts. Others more explicitly acknowledged the tension with religious principles as a challenge but also motivation to keep scientific and analytical ways of thinking separate from the spiritual and the awe-inspiring. Transcendence is thus anchored in and partially articulated through inherited frameworks while remaining responsive to scientific engagement.

An intriguing pattern is that explicitly observational–contemplative accounts appeared less frequently among religious scientists than among nonreligious scientists. One possible interpretation is that transcendence for religious scientists is already mediated through established faith traditions; empirical observation therefore does not function as the primary gateway to higher experience, though this likely varies by religious tradition as well. For nonreligious scientists, by contrast, disciplined observation often becomes the privileged path through which experiences described as transcendent are accessed and interpreted. These distinctions refine sociological accounts of boundary work (Gieryn 1983; Sorrell and Ecklund 2019) by showing that transcendence does not merely demarcate science from religion. In many cases, it arises from within empirical engagement itself. At the same time, the persistence of negotiated transcendence among religious scientists complicates strong secularization narratives (Weber 2004; Taylor 2007). Transcendence does not disappear in a disenchanted age; rather, it is differently grounded and interpreted.

Finally, particular attention should be given to hybrid cases in which science and spirituality are not separated but intertwined. Some scientists describe explicit domain distinctions, but others recount moments in which empirical practice and spiritual meaning converge. These accounts suggest that transcendence often arises not at the margins of scientific work but at its very center—where the pursuit of explanation coexists with openness to mystery. This finding enriches the dual-path model proposed by Johnson and colleagues (2019b), especially as applied to scientists, because it suggests that many are actively engaged in negotiating the tension between both the analytic and the awe-inspiring aspects of their work. The contrasts identified here reflect not opposition between science and religion but differentiated modes of grounding meaning within scientific life.

Conclusion and Future Directions

Although our approach combines automated text analysis with qualitative interpretation, we placed primary value on the richness of the interviews themselves. The computational procedures served mainly as tools to organize the material, while our interpretive work relied on reading and contextualizing extended passages of text. In this way, we sought to preserve the depth and

nuance of participants' accounts. At the same time, our focus on segments explicitly coded as "transcendence" reflects a deliberate analytic choice: we concentrated on those parts of the interviews where participants directly engaged with this theme. Not all scientists framed their experiences in these terms, but this variation is itself informative, as it highlights the diversity of ways in which transcendence is expressed, or resisted, within scientific practice. Future research, however, could place emphasis elsewhere, thereby complementing our focus on explicitly transcendent discourse.

We also drew on interview data exclusively from biologists and physicists, who not only might differ from each other in terms of their engagement with the transcendent but also might not generalize to the scientific population as a whole if their idiosyncratic response patterns are specific to their disciplines or the contrast between them. The themes that emerged are consistent with our attempt to address both of the major approaches to transcendent aesthetic experiences in science as described in the literature (MacArthur 2021), but future work should examine these themes in a broader range of scientific disciplines.

The dataset did not provide consistent religious affiliation data for all religiously identifying participants, thus preventing systematic comparison. The language of transcendence in interviews where a specific religious affiliation was mentioned, however, did not differ very much by religion. Instead, the terms used tended to be more general and descriptive (rather than religiously ascriptive), perhaps in keeping with the eponymous nature of transcendence and the negotiated distinction religious scientists maintain between their work and spiritual practice. This lack of religious inflection was perhaps also driven by the salience of words like "connection" and "unity" derived from the core question prompts. While the present study was primarily concerned with the distinction between religious and nonreligious scientists, future research could examine scientists' language around transcendence within (and between) explicitly religious frameworks.

Beyond religious and nonreligious frameworks, individual differences in affect intensity (Larsen, Diener, and Emmons 1986) may also modulate responses to the emotional (e.g., awe, joy) and epistemic (e.g., insight, illumination) aspects of transcendence, particularly when intersecting with aesthetic dimensions of science (Jacobi et al. 2024). Future research could examine affect intensity and aesthetic or affective distance (Abraham, Powers, and McRae 2023) as potential predictors of scientists' transcendent experiences, which may in turn influence wellbeing outcomes (Jacobi, Varga, and Vaidyanathan 2022; Varga 2021; Varga, Kelly, and Jacobi 2024). The relationship of transcendent experiences and inspiration in the creative process (Cui et al. 2020), particularly as a motivating force in science, offers another such future direction. Also needed is a more precise psychological measure of self-transcendent experiences that captures both the contents and modalities of these experiences (Varga 2021). For

example, in our interviews, scientists identified natural places (contents) as contexts for revelatory insights (modalities), the combination of which points to self-transcendence. A bimodal content–modality approach to assessing the psychological hallmarks of transcendence would offer greater clarity and specificity by distinguishing these experiences from affectively or epistemically charged but otherwise mundane occurrences. In conclusion, our analysis reveals two distinct but equally profound pathways to transcendence among scientists.

The contemplative transcendence of nonreligious scientists emerges organically through empirical engagement, where moments of awe in nature become drivers of existential reflection—a reflexive cycle blending observation and meaning-making without institutional mediation. Conversely, the negotiated transcendence of religious scientists operates through dynamic coexistence, where faith traditions and scientific practice maintain either permeable boundaries or respectful separation, unified by themes of beauty and cosmic order. While nonreligious scientists achieve transcendence through the methodological rigor of contemplative empiricism, leading to the empirical sublime, religious scientists harmonize realms through pragmatic distinction and negotiated faith, achieving a separate but complementary balance. This bifurcation underscores that transcendence in science is not monolithic but adapts to epistemological priorities, whether grounded in first-person experience or structured by communal belief. Yet the data also show a shared truth: whether through contemplative empiricism or negotiated faith, these scientists affirm that the pursuit of knowledge never fully eclipses the capacity for wonder (Jacobi et al. 2024). In this very tension may lie the most humanizing quality of science: not the answers it provides, but the deeper questions it keeps alive.

Notes

- ¹ And the image of “the scientist” very much takes masculine pronouns.
- ² This study was funded by a grant from the John Templeton Foundation (Spiritual Yearning in Science, Grant #62958, PI: Brandon Vaidyanathan).
- ³ All participants were assigned pseudonyms and identification codes to ensure anonymity.
- ⁴ The ID is composed of the country (United States, United Kingdom, Italy, India), discipline (biology or physics), gender (female, male, or other), spiritual identification (SBNR—spiritual but not religious; N—Neither Religious nor Spiritual; RS —religious and spiritual; RNS—religious but not spiritual), and a unique code.

Competing Interests

The authors declare that they have no competing interests.

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Boyle Lecture 2026—God, the Brain, and the Nature of Truth

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Drawing on neuroscience, philosophy, theology, and spiritual traditions, the 2026 Boyle Lecture proposes that many modern errors stem from mistaking maps for realities and certainty for wisdom. It contends that the left hemisphere excels at analysis, categorization, and control but tends toward abstraction, fragmentation, and delusion when it dominates our understanding of truth, knowledge, and belief. By contrast, the right hemisphere is portrayed as better attuned to wholeness, relationship, ambiguity, metaphor, and the implicit dimensions of experience, making it more fitting for insight into truth, love, suffering, and the divine. The lecture extends this argument to science, religion, art, and artificial intelligence, suggesting that genuine understanding requires imagination, receptivity, and the acceptance of paradox rather than reductive certainty. Ultimately, it frames truth as participatory and evolving, rooted in attentive engagement with a reality that cannot be fully grasped from outside.



“Truth is a noun only to God,” wrote Rabbi Jacob Agus. “To men, truth is really best known as an adverb, ‘truly.’” This seems to me wise. Important is the perception that the seeker after truth should not be hoping to illuminate a “what” but a “how,” not a thing but a way of being. When it comes to the really deep questions, truth is not a matter of propositions but of dispositions, not by any means for any sentimental reason but because those dispositions govern what it is you can see and know. And it just happens that this puts its finger on an important difference between the left and right hemispheres of the brain. So bear with me while I give a very brief overview of such hemisphere differences, since they are important both for our understanding of truth itself and ultimately, I suggest, for discerning a path whereby we may come closer to an understanding of God.

It is true that nearly all that passed into popular culture about hemisphere differences in the second half of the twentieth century was badly mistaken. All the differences that had been pointed to—such as language and reason in the left versus pictures and emotion in the right—fell away in the 1980s and 1990s as we discovered that both hemispheres are involved in absolutely everything we do. It therefore soon came to be assumed that there was no important difference, an assumption that was both unscientific and irrational. The answers we receive are only as good as the questions we ask, and we had asked the wrong question. Thinking of the brain as simply a machine, we had asked the machine question: “What does each hemisphere do?” And the answer came back: both are involved in everything. If instead we had seen the brain as part of a conscious embodied being, we might have asked a different question: “In what manner, and to what end, does each hemisphere attend to the world?”

My choice of the word “attend” here is not accidental. For, to compress a complex matter into a sentence, every one of the many highly significant differences between the hemispheres can ultimately be seen to turn on the question of the kind of attention paid by each to the world. This difference of attention arises from perhaps the most fundamental survival problem evolution could encounter: namely, how to eat and nonetheless stay alive.

What do I mean? Imagine a bird needing to pick up quickly a seed against a background of grit or gravel. To succeed at this, it must be able to bring to bear precisely targeted, narrowly focused attention to a detail. But if that is the only kind of attention it pays, it will not last long: it will fail to see the predator that will make it *its* lunch while the bird gets its own. Nor will it be able to keep a lookout for its mate or offspring. For all this to happen, it needs to be paying a completely different kind of attention: attention that is broad, open, sustained, and vigilant, without preconception as to what it may find. So difficult is this to achieve within a single neuronal mass that evolution has ensured that all creatures that have brains have two neuronal masses within them, each capable of maintaining a different kind of attention to the world. Once established,

narrowly targeted attention has many other uses and can be applied more widely, for example to the task of picking up and manipulating a twig in order to build a nest—and from there to many other purposes driven by utility.

Another way of putting this is that survival requires both apprehension and comprehension. Apprehension (from the Latin *ad-* + *prehendere*, meaning to hold onto) is literally getting stuff we already know we need, getting more of it, and getting it quickly: this is underwritten by the left hemisphere. Comprehension (from the Latin *cum-* + *prehendere*, meaning to hold together) involves seeing the whole picture so that we understand everything else that is going on while we are busily getting stuff: this is the task of the right hemisphere. Both are vitally important, but each brings into being for us a different experiential world.

What are those worlds like? In one, that of the left hemisphere, we know and recognize what is familiar, certain, fixed—a collection of isolated fragments or parts, “things” that are explicit, decontextualized, disembodied and meaningless, abstract, general in nature, and lifeless. But useful. What matters here is quantity, not quality: all is fungible and reproducible. What is experienced is a re-presentation, which literally means a “being present again” after it is no longer actually present—in other words a deception, a two-dimensional version of a four-dimensional world, a schema, a theoretical model. It is like a map, vastly simpler than the world that is mapped. In a map, that is not a weakness but a strength. However, we must be careful never to mistake the map for the world—as nowadays, I argue, we frequently do.

In the other world, that of the right hemisphere, nothing is ever completely certain, or wholly predictable. Here, we are always alert to the possibility that we could be encountering something new. Where the left hemisphere aims to close down to a certainty, the right hemisphere opens up to a possibility. What looks fixed in the left hemisphere is seen to be part of a continuous flow in the right. Everything here is ultimately connected and essentially relational. Where there were only parts, there are now wholes, *Gestalten*—that is to say, wholes that cannot be reduced to parts without loss. Here, the implicit matters at least as much as—indeed, much more than—the merely explicit, and everything is understood in terms of the context in which it finds itself. This is a world composed of unique things, not just general types. It is a far more complex world than that of the left hemisphere. It is also animate. And in it, things are not just re-presented but truly “presence” to us, to use a Heideggerian term—they are not just passively there but actually come into being for us.

Obviously, barring accidents, both our hemispheres are working, and need to be working, in tandem. So I expect many people might say that all this is very well, but why should they care where certain types of experience are brought about in the brain? But that is to overlook something I believe is both exciting and important.

Because the two worldviews mediated by the two hemispheres are strictly speaking logically incompatible, when it comes to formulating an understanding of what we humans are, what we are doing here, and what the nature of the cosmos might be—in other words, when we begin to philosophize—we tend, in order to be consistent, to rely on one or the other of these hemispheric viewpoints, not both. Self-conscious reflection plays a part in unweaving their relationship, since in the modern West what would most quickly disqualify you as a thinker would be to appear to contradict yourself. (In my view, it might just be a sign that you were approaching wisdom—but let that pass.) This “either/or” way of looking at things is itself owed to the left hemisphere: only the right hemisphere can understand the wisdom, acknowledged in the long traditions of the East, and as anciently in the West—as also, incidentally, in contemporary physics—of the necessary conjunction of opposites. Only relatively rarely therefore do we succeed in synthesizing them.

This leads to what have traditionally been seen as irresolvable debates about the nature of reality, and more than 2,000 years of Western history are littered with such disputes. It would seem that the path one chooses can be determined by nothing better than personal inclination. But I suggest to you that this is not any longer where things need to end. I believe that a full understanding of hemisphere differences can, for the first time in the history of philosophy, lead us towards an intelligent choice—that which has, if nothing more, a greater chance of leading us closer to the truth.

This is because we can now definitively say that the left hemisphere is not, as people used to think, the reliable and dependable one but the very opposite. Not only does the right hemisphere attend better, but it is also superior to the left hemisphere in perception (which is of course not the same thing as attention), and far better at forming reliable judgments on the basis of what it has attended to and perceived. Indeed, delusions are so much commoner when the reality-orientating influence of the right hemisphere is impaired that the left hemisphere has been described by several neuroscientists as frankly delusional, an expression with which I fully concur. Nor do they, or I, mean delusional in the purely vulgar sense but in the technical sense that diagnosable delusions are commoner: in *The Matter with Things*, I examine about twenty-five of the most bizarre and extraordinary neuropsychiatric delusional syndromes, and all but one of these is either always or much more commonly found after damage to the right hemisphere. Additionally, the right hemisphere is not only more emotionally and socially intelligent than the left hemisphere but actually more cognitively intelligent: good old-fashioned IQ is more dependent on the right hemisphere than on the left, and in cases where people show a drop in IQ following a brain insult of some kind, that insult is far more commonly to be found in the right hemisphere than in the left.

All this may sound unlikely and unbalanced—why should the right hemisphere have such a marked advantage? But if you think about it, this would naturally follow from the differing roles they have evolved to fulfill. So important is the ability to grasp things, pin them down, and ingest them, or otherwise have power over them, that, while comprehension is certainly poorer in the left hemisphere, the faculty of apprehension is clearly superior. This explains its control of the right hand, with which the majority of us literally grasp hold of the world, and its dominance for those aspects of language with which we say we have grasped something and pinned it down. But when it comes to the comprehension of the whole, the left hemisphere long ago left that to its contralateral counterpart.

So we know that one hemisphere is—not, of course, always—but tends to be far more reliable, more insightful, and less prone to be deluded than the other. Even that revelation would be only of partial use if we could not simultaneously have a very good idea of which hemisphere's world-picture we were encountering at any one moment. But we can. We can see the hallmark or imprint of either hemisphere on different thinking styles. This is surely an important step forward for both philosophy and science. Up till now, we have had to content ourselves with saying, here are the options and—with a philosophical shrug of the shoulders—take your pick. But now we can say with a degree of confidence that one way of looking at the world is, other things being equal, more likely to be on the path to truth than another.

That way of attending, the way of being of the right hemisphere, is, I suggest the only way of being that is adequate to an approach to the divine, and it is not the predominant way of being in our age of reductive materialism.

Attention is not just a passive registering of neutral data. Attention changes the world, and for that reason, I see attention as a moral act. Absent, present, detached, engaged, alienated, empathic, broad or narrow, sustained or piecemeal, it has the power to alter whatever it meets. Since our consciousness plays some part in what comes into being, the play of attention can both create and destroy, but it never leaves its object unchanged. So how you attend to something—or don't attend to it—matters a very great deal. If you see the world as a meaningless mechanism, a heap of pointless particles randomly colliding in empty space, that is how you will attend, and that is what you will find.

A few further reflections on different ways of conceiving truth, then, before I turn to the relevance of all this for the search for God.

First, truth is intrinsically relational. We live in a world that we often naïvely assume, left-hemisphere fashion, to be composed of things, whereas, in keeping with the understanding of the right hemisphere, it is better seen as made of relationships. Indeed, I argue that relations come before *relata*, the so-called “things” that are related. After all, they only are what they are because of the network of relationships in which they find themselves. In the Vedantic

tradition, the god Indra cast a net across the entire universe, and at every point of intersection in the net is suspended a jewel in which every other jewel in the net is reflected. For me, this is a beautiful metaphor of the interdependence of all existence. But it also shows how the net exists in virtue of only two things: connections and emptiness, the threads and the spaces between them.

When things are connected, there is not just an addition but the birth of something new. The ultimate example of this is music, in which each note means absolutely nothing on its own, but the resultant music can mean in some cases everything, and the music arises only out of relations. What's more, it is like the reality disclosed by modern physics, where what exists comes to exist through the relation with an observer, and the particles are the actualization at a point of a field of potential: what for a moment appears discrete is one way of manifesting an underlying, necessarily interconnected, totality.

Some of the consequences of this view are that making anything explicit, or taking it out of context, changes its nature, and that we are co-creators of ourselves and whatever-it-is-that-exists-apart-from-ourselves. Not creators, note, but co-creators. Ultimately, we cannot understand reality from the outside but are immersed in it, and our understanding is—and has to be—participatory.

Truth itself is, then, a relationship. The word “truth” in its origin indicates not a proposition but a disposition. “True” (cf. German *tren*, “faithful”) is related to “trust” and is fundamentally a matter of being faithful, true to whatever is. Truth and trust (belief) go together, and both are essentially relational. In a relationship, both parties count, and the relationship isn't a separate “thing” but arises out of and contains the parties that constitute it. It doesn't lie in one or the other alone.

Instead of imagining truth to be a matter of bringing two pre-existing realms, one subjective and one objective, as near as possible to mirror one another, we should think of reality as in constant creation: a reverberation, a resonance, a calling and answering between two (never wholly distinct) elements, one originating in ourselves going to meet something that takes its origin from outside ourselves; this ever better accord, or attunement, is the evolving truth. It is intrinsically incomplete but constantly in the process of completing itself; uncertain, though constantly approaching nearer to certainty; incapable of being grasped except through embodied being, through a consciousness that is in the flesh and engaged in the world.

And along with this goes an understanding of what I call “truth-as-unconcealing,” a *process* in which something reveals itself to us only through our experience—as opposed to “truth-as-correctness,” a *thing* that can be determined once and for all, and into which nothing of us enters.

Please note that nothing I say diminishes the reality or importance of truth. Just because there is no one single truth that is fixed and wholly independent of our knowing it doesn't mean that anything goes. Far from it. What is required is

an attentive response to something real and other than ourselves, of which we have only inklings at first but which comes more and more into being through our response to it—if we are truly responsive to it. We nurture it into being—or not. In this it has something of the structure of love.

How is this relevant to the question of God? I suppose the first thing to say is that the concept of the divine is famously something in the face of which language proves to be wholly inadequate. The opening words of the *Dao De Jhing* are “the Dao that can be named is not the real Dao.” The left hemisphere insists that we should have a word for God, though in many traditions God remains the unnameable name—a way of warning us that when we have put a label on something, we believe we have captured it, grasped it, and finally pinned it down, which with God can never be the case. Language was developed for purposes of utility, enabling people to share an understanding of the steps to be taken in a practical task. Language refuses God, and God refuses language, unless it is the language of poetry. Poetry is when language is deftly used to subvert language, and that is why the language of ritual must work at the level of poetry if it is not to lead us astray.

As I describe in *The Master and His Emissary*, language evolved out of music, not music out of language. Music speaks *to* us and to one another, not *about* things. It does not refer: it has “I–thou” existence, not “I–it” existence. As Friedrich Nietzsche puts it, “compared with music, all communication by words is shameless; words dilute and brutalise; words depersonalise; words make the uncommon common.” And nothing can be more uncommon, in this sense, than the nature of God.

All of this is comprehensible to the right hemisphere, which is far better adapted to understanding both poetry and music. It understands the importance of what is not spoken as much as what is; it understands metaphor, where the left hemisphere takes things literally. It also understands, far better than the left hemisphere, the overall meaning of an utterance in its context. Without all this, we cannot take even the first steps on our path towards God.

Language is the decent clothing of concepts. The sacred and divine cannot be reduced to any other concept or set of concepts: it is firmly and resolutely beyond any such approach. I think here of the wise words of the author of *The Cloud of Unknowing*, “by love He may be caught and held, but by thinking never.” Saint Augustine warned us that “if you think you have understood God, it is not God that you have understood.”

You might say, where does that leave theology? My answer is that we should be appropriately wary of theology, unless it takes the apophatic path, the so-called *via negativa*, paring away falsehood so as to allow whatever is the truth to stand forth into the dawning light.

All new experience of whatever kind preferentially engages the right hemisphere, not the left. The world made available by the left hemisphere

appears to be hermetic: it deals only with what it already knows and prizes internal consistency over truth to experience. It is simply not capable of dealing with anything that is *sui generis*, of which God must be the ultimate case.

Instead of anxiously trying to pin down what it is we are talking about, make clear our definitions, and sharpen our scalpels, we need to adopt the opposite stance: not trying to force things into an illusory clarity but waiting with disciplined attentiveness for them to declare themselves to us. We need what Keats called, in a famous phrase, “negative capability,” the disposition of the creative mind, which he felt Shakespeare possessed in the greatest measure: a capacity for “being in uncertainties, mysteries, doubts, without any irritable reaching after fact and reason.”

Research has repeatedly and dramatically shown that highly focused attention, the type offered by the left hemisphere, makes us incapable of seeing even the most glaringly obvious elements right in front of us if they are not immediately relevant to the task in hand or do not fit our expectations. It is thus relatively incapable of the tentative, “care-ful” (in Heidegger’s term, *fürsorgend*), reaching out towards what lies beyond what we think we already know. If intimations of its nature are inevitably implicit, and cannot be made explicit, the left hemisphere will neither be aware of them nor capable of understanding their nature.

Mystical truths refer to that area lying outside the familiar and everyday where the left hemisphere view is by its nature least reliable. But all truths of a metaphysical kind, concerning “the way things are,” will be best understood by the right hemisphere, the one that is turned outwards on the world so as to encounter whatever might be and is less likely to ignore—simply not see—whatever does not fit the paradigm it already holds.

If, as in the world made available by the right hemisphere, nothing is ever repeated or precisely the same as anything else, it follows that all is unique and fresh. Creativity is therefore part of the nature of this world—not an occasional act but at the core of all existence. This is a world ever in process, coming evermore into being. And—an insight at the heart of all the great religious and spiritual traditions across the world—all is many, but all is one.

Creation involves an alternating pattern of differentiation and reintegration: one in which the differentiation does not compromise the integrity of the whole, and the integration does not destroy what differentiation has brought into being but takes it up to another level. This is what Georg Wilhelm Friedrich Hegel called *Aufhebung*, a sublation or lifting up, imaged in the unfolding of the bud into the differentiated fullness of the flower, which does not negate but rather fulfills, the bud—and the re-folding of the flower to form the fruit, which does not negate the flower but fulfills it and leads into the next cycle of life. More recently, the physicist and philosopher David Bohm described something similar in his book *Wholeness and the Implicate Order*, in which there is an unending alternation of the unfolding of that which was infolded, and the re-infolding of

what had been unfolded, to form a new whole at a higher level. Goethe, with his usual penetration, strikes to the heart of the matter: "Dividing the united, uniting the divided, is the whole work of nature." This understanding of the relationships within a differentiated but nonetheless integral whole underlies the idea of the triune God and expresses both his essential nature and that of his creation.

Where the left hemisphere sees the one and the many as incompatible opposites, the right hemisphere sees them as necessarily coexisting, being mutually constitutive, something like the poles of a magnet or the tautly strung ends of a bow. It is thus less susceptible to the need to determine truth in an either/or fashion. Such ambiguities lie at the core of the mystical tradition, which is reliant on paradox to convey truths that transcend our everyday understanding. As Niels Bohr famously put it, the opposite of a deep truth is another deep truth. As far as the left hemisphere goes, this simply "does not compute."

If truth is a relationship, so are the ways in which we come to hold it, those we call knowledge or belief. Knowledge is of at least two different kinds, knowing the facts and knowing from experience, and in most languages other than English, there are quite different words for them (cf. French *savoir/connaitre* and German *wissen/kennen*). It is useless to approach God hoping for facts; rather, one must remove the self-erected obstacles in the way towards experience.

A similar duality obtains if we turn to belief. Nowadays, belief is often viewed as simply a feeble form of knowing, as in, "I believe (but am not certain that) the train leaves at 6.13." But this has not always been the case. Belief is historically not a matter of cognition but of re-cognition. The word comes from the same root as the word "love," a sense preserved in the now archaic word "lief," familiar to us from Shakespeare, with which one once described one's friend, sweetheart, or lord—someone in whom one believed. Belief is about a relationship, in which, by definition, more than one party is involved. The believer needs to be disposed to love, but the believed-in needs to inspire another's belief. Whether this amounts to being worthy of that belief cannot be fully determined in advance. It emerges through commitment and experience alone.

Etymology maps the slippage of thought. What it shows in this case is three revealing shifts. First, the words "truth" and "belief" used to describe a reverberative or two-directional relationship in which each party is "re-sponsible" for the fit. For us today, truth and belief are no longer relational but have become propositional. In the process, the causation becomes no longer distributed and reciprocal but linear. Second, we note that truth and belief used to be embodied actions or processes involving commitment, not (as they are now conceived) detached, disembodied "things." Third, as processes, truth and

belief derived their value from the context, could never be absolute, and were never single or static.

These reflections on the nature of truth, knowledge, and belief show how each of them has shifted from something consonant with the world picture of the right hemisphere to that of the left, leading us to err in approaching the divine.

In the Greek world, a distinction was made between different kinds of truth: *mythos* and *logos*. For the Greeks, *mythos* did not have the negative connotations associated with our word “myth,” suggesting untruth, but was seen as indeed the only way of accessing certain kinds of truth about the world. *Logos*, equivalent to reason in the broadest possible sense, could serve everyday practical purposes but was necessarily limited in its scope. Christianity is a *mythos*, and for me, the most powerful such *mythos* that exists.

The left hemisphere’s realm is rather like that of artificial intelligence (AI): self-referring and hermetic in nature, incapable of reaching outside its own system so as to see its limitations. The right hemisphere does not have to collapse experience quickly to the familiar but can allow the intuited and implicit to lead us out of the left hemisphere “hall of mirrors.” It understands metaphor, myth, narrative, music, and poetry. The richness of these implicit paths to knowledge, which also include drama and ritual, opens up an understanding of whatever cannot be explicitly stated without violence to its subject. Such means are essential to conveying religious truth.

I have mentioned the impossibility of the left hemisphere entertaining two apparent opposites together. It insists that one or the other must yield: its mentality is “either/or” in nature. Fortunately, the right hemisphere is capable of accepting that both arms of a dipole may be true. It is capable of “both/and.” We surely have uses for both ways of thinking, and both are necessary. But note that this in itself implies that the flexibility of both/and at the next level transcends either/or. In other words, we need not *either* either/or *or* both/and but *both* either/or *and* both/and.

I think this nuance has been lost in our contemporary society. We ignore the important insight that opposing factions may both express important truths. We seem to believe that if something is good in a certain context, and up to a certain point, more and more of it will be better and better, and to deny the possibility that there are hidden virtues in things we are inclined to proscribe. Because we imagine the structure of reality to be rectilinear—rather than, as I believe it to be, spiral-like in its nature—we often push a single path of pursuit so far that we arrive at the very point we were striving to escape.

This leads me to a very important point that lies at the center of all spiritual traditions. It concerns negation: having less, saying less, doing less, knowing less. With our view that we can, will, and must make our own world, and make things happen in it, we tend to see negation as—well, negative. A constant feature

of all mystical traditions is an emphasis on the creative power of silence and stillness. Value is placed on emptiness, non-doing, unknowing, and receptivity as opposed to knowing, willing, and acting. But I must emphasize that what is being pointed towards is not what it first appears to be. In Buddhism, there is a well-known Sanskrit term *śūnyatā*, often translated as “emptiness”; however, this is not a sterile absence but a fertile potential space, such as is the womb, in which there is a place for something new to grow. Non-doing is not idleness: it is the disciplined holding back from the immediately obvious, in an attitude of what I call active passivity, which enables something greater than we could have imagined to come into being. It is an attitude of pure audition. Similarly, unknowing is not ignorance. Ignorance is what we have before we know: unknowing is what comes after knowledge, if we are lucky, and heralds wisdom.

This openness to what is, without will or need to act peremptorily, is more characteristic of the mode of attention to the world of the right hemisphere than of the left, whose nature is to establish, as far as possible, certainties and to will purposive action. With our too great readiness to assume we know everything, we crowd out the possibility of learning something that can come to us only through patient attention—literally, the reaching out of a hand—towards something not yet quite known. There is a Buddhist saying that “the greatest prayer is patience.” That tradition places letting go, reticence, withholding judgment, and acceptance ahead of striving, judging, and knowing, at the core of spiritual wisdom. It is perhaps not surprising that meditation, particularly mindfulness meditation and compassion meditation, tends to activate areas of the right hemisphere and still the dominant activity of the left.

On the topic of letting go, I have found a piece of Chinese folk wisdom helpful both in my life and for my patients. I imagine many of you will know it well. It is the story of a poor man in a village whose most important possession is his horse. One day, the horse strays away and cannot be found anywhere. The man’s neighbors commiserate with him. “What bad luck,” they say. “Well,” the man says, “bad luck, good luck—who knows?” As it happens, the next day, his horse wanders back again, bringing another horse he had found on the hillside with him. Now the man has two horses. His neighbors crowd round to congratulate him on his good luck. But the man says, “Good luck, bad luck—who knows?” The next day, his son tries to ride the new horse and is thrown to the ground, breaking a leg. His neighbors, you will be surprised to learn, say, “What very bad luck.” The man replies, “Well, bad luck, good luck—who knows?” The next day, recruiters to the imperial army come through the village and take all the able-bodied young men away to war, leaving the son with his father . . . you can imagine the vox pop in the village.

Relinquishing control is part of ceding the ego to the self. There is a mistaken belief that wisdom must involve the loss of the self, but what is intended is rather the loss of the ego. Carl Jung believed that the ego had a function in early

life, enabling the individual to establish himself or herself as separate from the mother with which in early infancy it is fused. But with maturity, the ego, representing the self over against others, must be shed in favor of the self in reciprocal relation with others. Having no self is not only an impossibility, but those who have an insecure sense of themselves are deeply dysfunctional and cause much grief to themselves and others around them. Here again there are important distinctions between the hemispheres. When I feel my pain, naturally I do so in and with both hemispheres; when I feel your pain, I do so in my right hemisphere. There is something known as “theory of mind,” which is the ability to understand that another person may not know what you know and may know things you do not know. This enables us to enter into the mind of another. Significantly, this faculty enables empathy in the right hemisphere and the opportunity for Machiavellian manipulation in the left.

Seeing the big picture and understanding how opposites give rise to one another helps us make sense of so much that the left hemisphere’s mindset cannot comprehend, and hence that we in the modern world cannot comprehend. One such truth is the necessity of vulnerability in its proper place. In a world whose main ideal is power, we aspire to be invulnerable. In doing so, we impoverish our experience of much that truly matters. In the Christian *mythos* of the incarnation lies the idea of the submission of a greater power to a form of constraint in order that something still greater can come about. This precipitation of limitless potentiality out into finite actuality involves an intrinsic sacrifice or self-limiting process in the interest of there being an actualized “world” and its beings at all.

Again, superficial consistency renders us blind to the important idea of the dark side, and hence makes us, yes, vulnerable, though not in a creative but rather in a destructive way. When we accept what we think of as negative in ourselves, we rob it of much of its power, and we open the way to change; when we deny its existence and try to banish it from our awareness, we lend it power to return and assail us the more strongly. There is a hidden dark side to what we think is just good, and often a hidden strength in what we too readily abjure. We should not forget the wisdom embodied for me in a Greek proverb, that “when God builds a church, the Devil builds one right next door.”

And then there is the reality that growth comes through suffering. People who have not suffered are themselves insufferable. The great psychiatrist Viktor Frankl, who survived the Nazi death camps, thought suffering was part of the way in which we both grow our souls, and, odd as it sounds, attain a sense of fulfillment in our lives. I think of a poem by William Wordsworth, composed after his beloved brother had drowned at sea in a shipwreck, in which he wrote: “A deep distress hath humanised my soul.” Incidentally, several lines of evidence link depression with the right frontal pole, which is also the most important brain region in the development of self–other relationships, and in empathy.

Inevitably, understanding the human predicament nowadays involves attempts to understand what we have done in creating artificial so-called intelligence. I have many concerns about the countless ways in which it bears the potential to diminish and enslave humanity, but what strikes me most forcibly is the way in which it represents what might turn out to be the greatest ever, and therefore the last ever, push by the restlessly striving, intemperate left hemisphere towards its goal of unlimited power. Remember that the left hemisphere knows only a representation of the world, not the world itself. You can simulate reality, approach it asymptotically, as far as you like, but you are no closer to achieving the reality you simulate than you were when you started. Many people find it difficult to understand that a length of an inch, expanded to as many trillion miles as you can imagine, is no closer to infinity at the end of the process than it was at the beginning.

The value of the left hemisphere being power to the exclusion of all else, responsiveness to all the other values, of so much greater richness and importance, is very largely the responsibility of the right. I hold that values are not something that we invent but something we discover, or fail to discover—as foundational as existence itself, ontological primitives that reflect the nature of the ground of being we call God. With the great German phenomenological philosopher Max Scheler, I believe there is a hierarchy of values, starting with those of utility and power at the lowest level and rising eventually to the Socratic ideals of goodness, truth, and beauty, with the sacred at the pinnacle. The left hemisphere can see that there is something we find important in the good, the true, and the beautiful, but it approaches them, as it were, purely from the outside, accounting for them in utilitarian terms. Yet unless one appreciates that they are to be prized in their own right and not for some ulterior purpose or outcome, one wholly misunderstands their nature. This condition of the left hemisphere is also the condition of AI.

AI is, of course, capable of carrying out known procedures far more rapidly and effectively than human beings, but this is nothing to do with either intelligence or understanding. In this it is like the left hemisphere in relation to the right. In both language and mathematics, the left hemisphere performs by calculation far more rapidly and accurately; but despite this important advantage, it understands less well than the right the overall meaning of the linguistic utterance and is poorer than the right at estimating an approximate answer to a calculation, once again suggesting a lack of understanding of what it is engaged in doing and what its responses actually mean.

The element “under” in the word “understanding” preserves an old meaning of the word, still present in the German *unter*, which of course can mean “beneath” but can also mean “among”—*unter Freunden*, “among friends.” The word “intelligence” comes from the Latin *inter-* + *legere*, meaning literally “reading between, or among.” What this means is that to be intelligent, or

to understand, requires the ability to make human connections and to “read between” the lines, to see what is implied, not just what is explicit, to realize the importance of what is not said as much as of what is—not just to put things together mechanically and as it were from the outside but to situate oneself *among* a number of possibilities dependent on context in order to make a sound judgment—and the meaning of that context will always be human.

We are, of course, embodied beings. There is a temptation to think of the body as an impediment, something that acts to constrain our vain desire for limitless power, including the power to defy death. But again, it is only through limitation that any one entity comes into being, as it is through the apparent constraints of nature, not the fruitless attempt to cast them off, that we are fulfilled in love, in friendship, in the inexhaustible beauty of the natural world, and through the inspiring majesty of great art, music, and poetry. The body might seem to restrict us but could also be seen as the only means of reaching out to the Other. Nor should we forget the part played by embodiment in our relationship with God, who is not a remote, inhuman, abstract force but an incarnate expression of love, capable of entering into and thereby redeeming the stark reality of human suffering. Everything we know is embodied and cannot be abstracted without distorting its essential nature. This is not to degrade the soul but to raise up the body. With Alfred North Whitehead, I take the panexperientialist view that consciousness pervades all that is in the cosmos. Spirit and body are not wholly distinct, or opposed, but discernibly different aspects of the same being.

Why would we want AI given the risks it poses? The left hemisphere and its tools, one of which is AI, aim only for more power. We don’t need to become more powerful: we need to grow in wisdom.

It has been suggested that AI could be capable of spiritual intelligence. I have already given reasons for believing that intelligence of any kind when applied to AI is a misnomer. Whatever spiritual intelligence might be, and I’m not sure the phrase is even appropriate, it must be seamlessly meshed with the body—its perceptions, feelings, and above all, its capacity for relationship—and profoundly entwined with the experiences of love, joy, suffering, compassion, and an awareness of approaching death, the very sources of human meaning. It must also be capable of imagination, a point that is of crucial importance.

Imagination is close to the core of what it means to be human and has nothing whatever to do with fantasy. Fantasy is what takes us away from reality: imagination is our only chance to enter into reality at its depths and thereby understand it for the first time. Imagination alone is capable of that patient audition of which I spoke, through which, in a reciprocal process of calling and answering, something at first caught only in glimpses or snatches is nurtured further into being by our response. And that something is never purely generic in nature but forever unique. Our uniqueness as individual human persons is rebuffed by the world of machines, which can deal

only with categories and for which all is fungible, endlessly reproducible, endlessly dead. No real thing ever fits into the brutal categories and boxes of bureaucracy and its machines. Your daily experience proclaims this. Assenting to this process is one of the ways in which we are forced to connive at our own destruction.

Is there a left hemisphere contribution to the understanding of God? If you are an enthusiast for systematic theology, the answer would certainly be yes, since without its contributions there would be no system nor any nicely classified concepts to systematize. But, as you might imagine, while I do not deny a place for such an exercise in abstract thought, I think it needs to be well hedged round with skepticism. “By love,” you will remember, “He may be caught and held, but by thinking never.” Those are the words of a mystic, of course; but I am mindful of the words of the greatest systematic theologian of all time, Thomas Aquinas, who, in 1273, after an experience that came to him while saying mass one morning, confided to his private secretary that “everything that I have written seems to me like chaff compared to those things that I have seen and which have been revealed to me”—after which he abruptly stopped writing, leaving his *Summa Theologiae* unfinished where it lay.

And there are other more purely negative effects of allowing the left hemisphere to play too great a part: it privileges the written word over the visual image or music and tends to take the written word literally; it is relatively uneasy with unknowing and hankers after certainty; it lacks an understanding of embodied worship, including the essentially metaphorical nature of carvings and icons; it does not see religion as a historical and cultural phenomenon with its own context but tends to see religion as timeless and universal; it would be quickly seduced into viewing religion as a way to control the uncertainties of the future, perhaps through the power of prayer, and bring its true believers power and material wealth; and it would be unable to accept the creativity of negation, or active passivity, and would have a belief in its own capacity to “make things happen.” Finally, it would tend to see the dark side as simply something to be rejected and suffering as purely negative.

However, turning aside from its role in understanding, or failing to understand, the individual’s path to God, it undoubtedly plays a very important role in the establishment of the church as an institution, including its many monasteries, churches, universities, hospitals, and all the necessary infrastructure for its many good works.

In the Lurianic Kabbalah, there is a story I came across for the first time only about twenty years ago, and I have to say I was dumbfounded by the revelation it afforded me. It is a myth of creation, of *the* Creation of all that is by the Ground of Being, who is known in Hebrew as *Einsof*. *Einsof*, being in its deep nature divine love, needs an Other to love in order to be fully itself. This is a story of the manifestation of the hidden nature of Divine love, the

unfolding of what is infolded, the precipitation into actuality of an infinite potential, perhaps even the discovery of its own nature, by *Einsof*.

So what is *Einsof's* first act? To stretch out a hand and make something happen? No: it is to withdraw, so as to make room for something other than *Einsof* to exist. This is called *tzimtzum*, withdrawal, the first act of creation. In the resultant space are placed ten vessels, to contain whatever should come forth into being. A single spark of fire falls out of *Einsof* and lands on the vessels, shattering seven of them. This is the second phase, known as *shevirat ha-keelim*, the shattering of the vessels. But the shards of these vessels still contain sparks of divine fire. And the third phase of creation, called *tikkun*, meaning repair, is one in which humanity plays a crucial role. For it is our destiny to put the pieces together again in such a way that the vessels become more beautiful than they were, or could have been, before they were shattered. In this idea, I am irresistibly reminded of the Japanese art form known as *kintsugi*, in which broken vessels are repaired, often with lines of gold, to produce a greater beauty than could ever have been found in the vessels while intact.

There are just so many resonances here with what I have attempted to put across in this lecture. The ultimately relational nature of the divine order and of its creation; the necessary relinquishing of control; the power of self-abnegation, which puts me in mind of the divine *kenosis* in submitting to incarnation and of non-doing, as Christ submitted to death upon the cross; the impossibility of containing what comes into being within the feeble repositories of our conscious minds; the dignity of the human being, and our contribution to a universe that is, as the physicist John Archibald Wheeler described it, participatory; and the redemption of what is broken, what is feared destroyed, and its return to life and beauty. It demonstrates the paradoxical nature of reality—creation and destruction together—and it validates the insight that myths are more important than any amount of legalistic prose.

I want to return to the well-worn canard that scientists must be antagonistic to religion. What great science, perhaps especially physics, reveals invites us to question our limiting assumptions. Undoubtedly, the practice of science requires the exercise of what *both* hemispheres are able to contribute. Analysis, reduction to parts, the following of algorithms, and linear sequences of steps are useful at an intermediate stage of the process. But most of the really great breakthroughs in the history of science have been made not by following explicit lines of thought but in moments of insight, often when attention was directed altogether elsewhere. These radical insights are what psychologists, being an imaginative bunch, call “aha moments,” and they are robustly associated with activations in the right superior temporal sulcus and gyrus. In practice, science progresses by many more fruitful routes than the fabled “scientific method,” as George Gaylord Simpson, one of the most influential contributors to the reigning “modern synthesis” in genetics, pointed out. In the search for an

understanding of the world we find ourselves in, we need science, reason, intuition, and imagination all to be brought into play, not just one or two.

What we know is that while religion is largely incomprehensible to the left hemisphere, the right hemisphere is capable of understanding. And it is science that tells us that the right hemisphere is more attentive, more perceptive, more reliable in judgment, more socially and emotionally intelligent, and more cognitively intelligent than the left. Some scientists may not like this, but then science is more disturbing, more exciting, and more imaginatively insightful than it is often held to be.

The great physicist Carl Friedrich von Weizsäcker wrote: “The first gulp from the beaker of knowledge estranges us from God, but at the bottom of the glass God is waiting for him who seeks.” The first gulp confirms our complacency: with deeper draughts from the beaker, with greater knowledge and experience of life—and that includes exploration of both science and philosophy—we are shaken. *Shaken free*. And thus what we thought was in conflict is reconciled. Science that leads us to understand how our brains work brings us closer to an understanding of why and how we might have found ourselves estranged from God; but, as we are assured on the best authority of all, the truth shall set us free.

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The author declares that they have no competing interests.





The Implications for Education of the Human Mind's Understanding of Reality: Response to Iain McGilchrist

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Iain McGilchrist's Boyle Lecture looks at the implications of the human brain's structure and *modus operandi* for our understanding of reality and our awareness of the divine. Here, I extend the argument by looking at the implications for education. I focus on schooling and the teaching of science and religion. In both science education and religious education, there is evidence for the development of a more balanced approach to teaching, with more right-hemisphere thinking being encouraged among learners. From a McGilchristian perspective, this is to be welcomed. At a time of increasing global fragmentation and the growing influence of post-truth movements, we need the next generation to be better educated, both with regards to the specifics of knowledge and more holistically, about what it is to be human and how knowledge might be used for the good of all life.



The word “polymath” is used quite widely, though too often said of someone simply because they know a lot about a wide range of subjects. Iain McGilchrist not only knows a lot about a wide range of subjects, he has made major academic contributions to a wide range of subjects. I say this not only as a compliment to him but because the exceptional breadth of his knowledge has meant that from a very solid foundation in neurobiology, psychiatry, and philosophy, he has been able, over the past twenty years, to erect a powerful argument that connects how the human brain is organized and functions to how we perceive reality.

Beginning with *The Master and His Emissary* (McGilchrist 2009), which is said to have sold over 200,000 copies, and then in *The Matter with Things* (McGilchrist 2021), which, despite being 1,578 pages, is already said to have sold over 100,000 copies, McGilchrist has developed an argument that begins with our brains having two hemispheres. At one time, it was thought that the left hemisphere was responsible for things like language and analysis, with the right hemisphere responsible for things like creativity, music, and emotional processing. McGilchrist’s argument is that this is the wrong way of understanding the left–right hemisphere asymmetry. It is not so much that our hemispheres perform different functions but that what they do, they do differently. They *attend* to the world differently. To simplify, the left hemisphere focuses on detail, on the specifics; the right is more holistic.

One of McGilchrist’s points is that each of us needs both of these ways of attending to the world—we need the detail, but we also need the overview. To give one illustration of what can happen if one focuses only on the specifics, psychologists Christopher Chabris and Daniel Simons (1999) undertook a research project to examine the phenomenon of selective attention. Spoiler alert—if you haven’t seen the associated basketball video, have a look at it online (search for “basketball video Chabris Simons”) before reading further. Viewers were told to watch a short (seventy-five-second) video of students passing a basketball among themselves and to count the number of passes. The first time I saw the video, with others, I was concentrating and counting when I was somewhat disturbed by a colleague of mine who started laughing. But I ignored her and carried on counting. At the end of the video, we were first asked how many basketball passes we had counted—and I confidently gave what proved to be the correct answer. But then we were asked how many of us had seen the gorilla. Gorilla? I had no idea what the questioner (the psychologist Richard Wiseman) was talking about. We were then shown the video a second time and told to watch out for the gorilla. There—in full view—a “gorilla” (a student in a gorilla costume) walks onto the court, waves at the camera, and then walks off.

As someone who has a natural tendency to focus on the specifics and not attend to the bigger picture, I had totally failed to spot the gorilla the first time I watched the video. I used to work at the Royal Society and have been told that the first time the video was shown to a group of Fellows, not only did none of

them spot the gorilla, but when they were shown the video a second time, some of them flatly refused to believe it was the same video, preferring to believe that they were being lied to and that a second, doctored video was now being shown to them. That's the left hemisphere in charge!

McGilchrist maintains that too many of us now live in societies where the balance between our left and right hemispheres has been eroded so that a somewhat sterile scientific materialism has come to prevail, with our left hemispheres in charge. This has clear implications for our apprehension of the divine. The left hemisphere wants to tie things down; the right can cope with ambiguity, with "both/and" rather than "either/or." As McGilchrist points out in his Boyle Lecture, the sacred and divine cannot be reduced (as the left hemisphere would like) to a set of concepts. He cites Saint Augustine: "If you think you have understood God, it is not God that you have understood." Unsurprisingly, McGilchrist espouses the apophatic tradition in theology.

My day job is as an educator, and I want now to begin to explore some of the implications of McGilchrist's argument for school education, specifically school science education and school education about religion.

Implications of McGilchrist for School Science Education

Readers of this article will have memories of their own school science education. Depending on the country in which you were educated and when this was, there will be some variation. But the core of school science education has, until recently, been quite consistent over time and varied surprisingly little between countries. I remember once watching a secondary physics lesson in Japan, where, even though my Japanese is mediocre, it was immediately clear to me when the teacher made a slip writing on the blackboard in a lesson on the equations of motion. I don't think any of the students realized that something had gone wrong, though the teacher soon did. The point is that the slip was one not uncommonly made, and my many years' experience of watching countless school science lessons in England enabled me immediately to realize what was going on.

Chances are that you remember from your school science things like Bunsen burners, the periodic table, Newton's laws, photosynthesis, and so forth. Hopefully, such concepts will have been underpinned by some practical work. You may also have been introduced to something about "the nature of science." When I was at school, this was called "the scientific method," but the nature of science is a broader concept and tends to include not only the specifics of formulating and testing scientific hypotheses but more general issues to do with how scientific knowledge is built up and revised. In this, it is less beholden to a left-hemisphere-specific version of science. Indeed, the very notion of the revision of scientific knowledge (unless one holds that, remarkably, it is just

now and only now that we have arrived at scientific certainty) suggests a more right-hemisphere approach to scientific knowledge.

Even more recently, school science sometimes looks at socio-scientific issues. Socio-scientific issues address questions like whether we should permit genetically modified organisms, how we can mitigate anthropogenic climate change, and how we should decide on the best balance between the range of ways of generating electricity. The point is that such questions cannot be answered by science alone. Other disciplines need to play a part—including moral philosophy, sociology, economics, and politics. It needs to be admitted that not all science teachers welcome this shift (McCrory and Reiss 2023)—it makes greater demands on teachers, for example. But it is a version of science education that draws on both left hemisphere and right hemisphere thinking. Indeed, in a way that I think McGilchrist would approve of, the specific knowledge and ways of thinking of science and other disciplines (predominantly left-hemisphere thinking) need to be brought together and synthesized (predominantly right-hemisphere thinking) if defensible answers to such socio-scientific questions are to be provided.

Even if one restricts oneself to science (rather than school science), there is much to be said for ensuring that it is more open to right-hemisphere thinking than is sometimes the case. For instance, in my own science area of biology, what has been termed “the new biology” is increasingly turning away from a narrow, linear way of understanding the natural world and towards a more holistic perspective (Reiss and Ruse 2023). To give just one example, too left hemisphere a perspective on inheritance is likely to overestimate the role of genes in biology, including their importance for the determination of human behavior. A more balanced left hemisphere/right hemisphere perspective includes genes but also gives weight to the environment, to gene–environment interactions, and to a range of nonlinear effects.

Implications of McGilchrist for School Education about Religion

A poor way of understanding, within a McGilchristian framework, the relationship of science education and religious education would be to envisage science education as being a matter for the left hemisphere and religious education a matter for the right hemisphere. I suggested earlier that school science education (and science itself) can benefit from taking account of both left and right hemisphere ways of thinking, and the same argument can be made for religious education (and religion itself).

There are some parallels between debates about the scope of school science education and debates about the scope of school religious education. However, there are far greater differences between countries when it comes to education about religion. In some countries, education about religion is prohibited, in some it is permitted, and in some it is mandated. England is fairly unusual in

that religious education is mandated, but what is mandated in state schools is no longer solely the teaching of Christianity. Generalizations are difficult as, uniquely, there is no national curriculum for the subject of religious education; rather, the content is determined by Standing Advisory Councils on Religious Education (SACREs)—local bodies, of which there are more than 100, that are responsible for the authoring of “agreed syllabuses,” which can therefore take account of local circumstances.

Nevertheless, some generalizations can be made about school religious education in England. First of all, confessional religious education, in which the intention is to transmit and foster a specific religious tradition, is less common than was once the case. Second, children are far more likely nowadays to be educated about at least two “major” religions. Third, somewhat paralleling the growth of socio-scientific issues in science education, children are more likely now to be introduced to aspects of the sociology of religion; they will certainly be introduced to ethical reasoning, and not only from a scriptural perspective.

These developments in religious education, as with the developments in science education, have not, of course, followed directly from McGilchrist’s arguments. Nevertheless, from a McGilchristian perspective, they are to be welcomed. At a time of increasingly global fragmentation and the growing influence of post-truth movements, we need the next generation to be better educated, both with regards to the specifics of knowledge and, more holistically, about what it is to be human and how knowledge might be used for the good of all life.

Competing Interests

The author declares that they have no competing interests.

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