

“Physics Within the Bounds of Feeling Alone” Matthew David Segall

“...the sight of a starry heaven on a clear night gives a kind of pleasure which only noble souls experience. In the universal stillness of nature and the tranquility of the mind, the immortal soul’s hidden capacity to know speaks an unnamable language and provides inchoate ideas which are certainly felt but are incapable of being described.”
–Immanuel Kant¹

“The primitive form of physical experience is emotional—blind emotion—received as felt elsewhere in another occasion and conformally appropriated as a subjective passion...in its relevance to a world beyond...[though] the relevance is vague. In the phraseology of physics, this primitive experience is ‘vector feeling,’ that is to say, feeling from a beyond which is determinate and pointing to a beyond which is to be determined.”
–Alfred North Whitehead²

“When we enjoy fact as the realization of specific value, or possibility as an impulse towards realization, we are then stressing the ultimate character of the Universe.”
–Alfred North Whitehead³

“...people seek to understand things not in relation to the universe, as unified, but as separate from one another, just as they seek to understand themselves in isolation and separation from the universe: there you see science become sclerotic and disintegrated, with great effort expended for little growth in knowledge, as grains of sand are counted one by one to build the Universe.”
–Friedrich Wilhelm Joseph von Schelling⁴

“...even Russell talks on occasion of ‘the feeling of reality’”
–James Bradley⁵

Introduction: The Physics of Consciousness

“Humans are blobs of organized mud.” So begins physicist Sean Carroll’s popular book *The Big Picture: On the Origins of Life, Meaning and the Universe Itself* (2016). His book aims to show how atoms in motion according to the laws of physics could give rise to the full array of human values and meaning, including all our thinking, feeling, and willing. Process philosophers generally eschew such “brilliant feats of explaining away,”⁶ affirming instead that these hardcore commonsense⁷ capacities are not only essential ingredients making possible the civilized phases of human society (including the scientific enterprise itself), but also that they are high-grade exemplifications of powers latent throughout the physical universe. Such powers—which we have direct practical experience of in our own consciousness—count as evidence that any

¹ *Universal Natural History and Theory of the Heavens* (1755/2009).

² *Process and Reality*, 162-163.

³ “Immortality” in *Essays in Science and Philosophy*, 83.

⁴ *Aphorismen über die Naturphilosophie*, 3-4. Thanks to Christopher Satoor for help with this translation.

⁵ “Act, Event, Series: Metaphysics, Mathematics, and Whitehead,” 234.

⁶ Whitehead, *Process and Reality*, 17.

⁷ For more on the importance of “hardcore commonsense” intuitions in the assemblage of an adequate metaphysical scheme, see David Ray Griffin’s *Unsnarling the World-Knot: Consciousness, Freedom, and the Mind-Body Problem* (1998), 20.

comprehensive cosmology needs to account for.⁸ Carroll leans on his scientific credentials to assure us that even our most prized “inner experiences” can only really be “a way of talking about what is happening in the brain.”⁹ While he does want to find some way of poetically resurrecting a self-made meaning worth living for, Carroll remains a hard-nosed physicalist generally adhering to the dictum that “facts don’t care about your feelings.” But what if our feelings are among the facts? What if, indeed, feeling is the only medium through which facts might come to matter?

This paper aims to bring natural science to its senses. Physicists like Carroll may call themselves physicalists, but I hope to show that the project of “explaining away” that he is engaged in, while exceedingly clever in its use of abstractions, is really a confused form of model-centric idealism. Contemporary physical cosmology is suffering from a bad case of misplaced concreteness due to the lingering residue of unresolved Kantianism. As an aid to my aim, this paper continues prior efforts to read Whitehead’s philosophy of organism as a descendent of Schelling’s *Naturphilosophie*, and, to state the same in reverse, to interpret Schelling’s *Naturphilosophie* as a precursor of process philosophy.¹⁰ Situating Whitehead’s cosmological scheme in lineage with Schelling’s philosophy of nature invites a dialogue with Kant, both in his pre-critical cosmological phase and in his later turn to transcendental idealism. Like Whitehead, Schelling philosophically generalized the findings of the new paradigm sciences of his day to articulate a vision of cosmogenesis as a panpsychic process of dynamic evolution. Also like Whitehead, his core premise was that Kant’s critical appraisal of sense perception unduly severed the conscious mind from its roots in a living ground: “Idealism is the soul of philosophy; realism is the body; only both together can constitute a living whole.” Living nature, Schelling continued, is the medium within which mind becomes real by taking on flesh and blood.¹¹ Whitehead similarly complained that Kant’s distorted treatment of perception as a merely subjective process uprooted from anything actual left natural philosophy floating in the thin air of abstract modes of thought grasping for artificial sources of experiential togetherness, as if a merely apparent world might satisfy our thirst for knowledge.¹²

Though often characterized as an absolute idealist, Schelling can and has been read as a radical empiricist.¹³ Through his influence on scientific giants like Alexander von Humboldt, he made important contributions to the development of what is nowadays referred to as the ecological worldview.¹⁴ Despite his rejection of the mechanistic materialism guiding most modern scientific inquiry, historians of science have argued that the omission of Schelling’s *Naturphilosophie*

⁸ “Comprehensive” here signals that for Whitehead a cosmological scheme must account not just for physical happenings, but also for human experience, since we, too, are among the elements in the universe.

⁹ Carroll, *The Big Picture*, 3. If consciousness (i.e., all our thinking, feeling, and willing) is really just a way of talking about what is happening in the brain, then presumably all our scientific knowledge is also just a way of talking about what is happening in the brain.

¹⁰ See *Physics of the World-Soul: Whitehead’s Adventure in Cosmology* (2021), especially the Introduction “Whitehead’s Schellingian Inheritance.” See also “Goethe and Whitehead: Steps to a Science of Organism,” in *In Dialogue: Journal of Holistic Science*, Vol. 2 (2022) and *Crossing the Threshold: Etheric Imagination in the Post-Kantian Process Philosophy of Schelling and Whitehead* (2023).

¹¹ Schelling, *Philosophical Investigations into the Essence of Human Freedom*, 26.

¹² Whitehead, *Process and Reality*, 113.

¹³ See Bruce Matthews’ “Translator’s Introduction” to *The Grounding of Positive Philosophy* (SUNY, 2007), 22.

¹⁴ See Andrea Wulf, *The Invention of Nature: Alexander von Humboldt’s New World* (2015), 128-129.

from the historiography of nineteenth-century physics “impoverishes our understanding of it.”¹⁵ In his final public lectures in Berlin in 1842, Schelling called German philosophers to take up a deeper empiricism no longer artificially limited to the “mere sensation” of the outward facing senses but inclusive of the “inner sense of the emotions” or feelings, which he adds “is a sense that still very much needs a critique.”¹⁶ In his Gifford lectures delivered in Edinburgh in 1928 and later published as *Process and Reality* (1929), Whitehead “[aspired] to construct a critique of pure feeling, in the philosophical position in which Kant put his *Critique of Pure Reason*.”¹⁷ He was not directly conscious of having answered Schelling’s call, but I hope to show that answer it he did. His aspiration was to invert Kantian transcendentalism so as to reconnect the human mind and its scientific knowledge with the physical world it desires to know¹⁸ (an inversion I have elsewhere characterized as “descendental philosophy”¹⁹): “For Kant, the world emerges from the subject; for the philosophy of organism, the subject emerges from the world—a ‘superject’ rather than a ‘subject.’”²⁰ Reimagining physics within the bounds of feeling alone entails overcoming the bifurcation of nature so as to understand how it “is that the energetic activity considered in physics is the emotional intensity entertained in life.”²¹

Naked Physics: Kantian Analogies

Students of German Idealism will recognize my title as a play on Kant’s 1793 book *Die Religion innerhalb der Grenzen der bloßen Vernunft*. A typical translation is “Religion Within the Bounds of Reason Alone.” However, the term “bloßen” can also be translated as “naked” or “bare,” thus preserving Kant’s metaphor concerning the difference between biblical religion “clothed” in historical trappings like ritual and prayer, and rational religion stripped bare of such superstitions (as he understood them), leaving behind only the underlying categorical principles of moral duty. My purposes are quite different from this late text in Kant’s *oeuvre*, as I am focused on science rather than religion, and on feeling rather than Reason. A younger, pre-critical Kant’s attempt to explain the origin of the cosmos on mechanistic principles alone²² proves more relevant, as the goal of this paper is to articulate and defend a Whiteheadian approach to cosmology respectful of

¹⁵ See Caneva, K. L. (1997). “Physics and *Naturphilosophie*: A Reconnaissance” in *History of Science*, 36. Caneva investigates the alleged historical linkage between Schelling’s *Naturphilosophie* and Faraday’s development of electromagnetic theory through the intermediaries of Samuel Taylor Coleridge and Humphry Davy, but finds little evidence of any direct textual ties. Perhaps we can still see a conceptual convergence despite the lack of evidence for direct historical influence. Historians of process philosophy should also consider the lineage from *Naturphilosophie* through Hermann Grassmann to Whitehead.

¹⁶ Schelling, *The Grounding of Positive Philosophy*, 168.

¹⁷ Whitehead, *Process and Reality*, 113.

¹⁸ Whitehead was already well on his way to this inversion in a 1915 paper, “Space, Time, and Relativity” (republished in *Interpretation of Science*): “If I understand Kant rightly...he holds that in the act of experience we are aware of space and time as ingredients necessary for the occurrence of experience. ...this doctrine should be given a different twist, which in fact turns it in the opposite direction—namely, that in the act of experience we perceive a whole formed of related differentiated parts. The relations between these parts possess certain characteristics, and time and space are the expressions of some of the characteristics of these relations. Then the generality and uniformity which are ascribed to time and space express what may be termed the uniformity of the texture of experience” (100). Thanks to Joseph Petek for reminding me of this reference.

¹⁹ See *Crossing the Threshold* (2023). Schelling also referred to this inversion as a “*philosophia descendens*” (*The Grounding of Positive Philosophy*, 196).

²⁰ Whitehead, *Process and Reality*, 88.

²¹ Whitehead, *Modes of Thought*, 168.

²² See *Allgemeine Naturgeschichte und Theorie des Himmels/Universal Natural History and Theory of the Heavens* (1755).

the hypothetico-empirical methodology of physics but critical of the physics community's stubborn attachment to model-centric materialism.²³ In place of this long defunct ontology, I affirm the panexperiential metaphysics of organic realism.

A few analogies can be drawn in connection with Kant's 1793 treatise that justify my playful homage to his title. In the midst of a discussion of the "muddle-headed positivism" still infecting the minds of many contemporary physicists, who "arbitrarily [apply] its doctrine and arbitrarily [escape] from it,"²⁴ Whitehead makes use of a similar analogy to illustrate the way such an inconsistent, quasi-Kantian positivism²⁵ ignores half the evidence provided by human experience: "[Positivist physics] examines the coat, which is superficial, and neglects the body which is fundamental."²⁶ Whitehead's criticisms of the arbitrary application of the positivist doctrine is based on an inconsistency between the theory and the practice of contemporary physicists. On the one hand, the physics establishment insists it abides by a hypothetico-empirical method whereby only those statements that can be directly verified by experiment are considered scientific. On the other hand, many physicists are pursuing the mathematical elaboration of grand unifying theories composed of byzantine layers of numerical models stacked upon models whose free parameters are "post-dictively" (i.e., the opposite of predictively) adjusted as new data comes in.²⁷ In other words, contemporary physical cosmology has hitched some of its now multibillion-dollar research efforts to a curiously circular logic akin to the methods of ancient Ptolemaic astronomers who simply added another epicycle or deferent to their geocentric model of the heavens as anomalous observations were reported.²⁸ Further, physical models rooted in the causal closure of mathematical symmetries neglect the extent to which such symmetries are inevitably broken, both by fundamental quantum processes and in the course of the emergent evolution of the actual universe.²⁹

Whitehead's point is not that physics ought to avoid using mathematical models. Rather, his protest against the bifurcation of nature is an attempt to prevent physicists from unwittingly engaging in (bad) metaphysics by mistaking their abstract models for concrete reality. Somewhat inverting his coat metaphor, Whitehead's contention is that the early twentieth century's advance beyond the simply located and self-subsistent matter of classical physics to the relational

²³ For another example of a Whiteheadian rebuttal of model-centrism in physical science, see Auxier and Herstein's *The Quantum of Explanation: Whitehead's Radical Empiricism* (2017), 98ff.

²⁴ Whitehead, *Modes of Thought*, 149.

²⁵ See Francis Israel Minimah, "The influence of Kant's critical philosophy on Logical Positivism" in *Inkanyiso: The Journal of Humanities and Social Sciences*. Despite important divergences on core philosophical tenants, including crucially the possibility of synthetic *a priori* knowledge, Minimah makes the case for the direct influence of Kant's critique of dogmatic metaphysics and analytic/synthetic distinction on the rise of logical positivist philosophy in the early 20th century.

²⁶ Whitehead, *Modes of Thought*, 154.

²⁷ For more on "post-diction" in contemporary physical cosmology, see Timothy E. Eastman's presentation for the Cobb Institute, "Creative Cosmos," on November 15, 2022. Available online: <https://youtu.be/JRJoIXDV7Lo> (timestamp 35:12). Cite "Cosmic Agnosticism" in *Process Studies*.

²⁸ See Bjørn Ekeberg's *Metaphysical Experiments: Physics and the Invention of the Universe* (2019) for more on the covert metaphysics of contemporary physics. Ekeberg draws on astronomer Michael Disney's recent criticisms of model-centric physics to argue that "the current set of theories that constrain and guide the activity of researchers is a shaky edifice based on far fewer actual observations than the number of specially hypothesized parameters used to explain them" (5).

²⁹ See Eastman, Timothy E., *Untying the Gordian Knot: Process, Reality, and Context* (2020), 148-149.

energetic processes of contemporary relativistic and quantum physics is insufficient for a comprehensive cosmology. The “bare activity” mathematically described by post-classical physics must be infused with full-blooded life.³⁰ Absent such a philosophical recontextualization of the “chill abstractions” of modern science by way of their reintegration with the vital purposes realized in the concrete experience of the scientists who entertain said abstractions, humanity can find no justification for the ideals guiding its civilized phases.³¹ Physicalists like Carroll take the abstract meta-models of mathematical physics as what is “really real,” and then set to work trying to derive their own concrete conscious experience, including their valuation of science itself, from the playing out of the laws described in these bare equations. Carroll depicts the last few centuries of scientific progress as an irrevocable cultural transformation with far-reaching implications that many people have still not confronted. We are, he says, like Wile E. Coyote having just run off the edge of the cliff and still afraid to look down. The ground has disappeared beneath our feet, leaving all our old ideas of human purpose and moral personhood to evaporate into the vacuous vibrations of particle-fields. Lacking a living ground to replant his misplaced concreteness, Carroll counsels us instead to get to work building the “conceptual jet packs”³² required to reconstruct what can only be described as a make-believe doll-house version of meaning and value, good enough at least to get us out of bed in the morning, for tomorrow we die, and the rest is silence.

The philosophy of organism takes the converse route, deliberately engaging in thoughtful, experientially grounded metaphysical generalization by seeking a thoroughgoing conception of reality that leaves no room for special exceptions or miraculous insertions (e.g., the emergence of conscious scientific minds capable of purposefully investigating and reverse engineering the entirely mindless, purposeless physical world they are supposed to have come out of). Nor are organic realists prepared to accept the reduction of human life to a theater of the absurd. This means that our conception of actuality must overcome arbitrary divisions between the moral and the physical, the aesthetic and the causal: “The world must not be split in two. You cannot after your description of the universe say ‘oh, by the way, there are values.’”³³ Perhaps no stronger objections have been raised against any moral conception of the physical world than those of David Hume in his *Dialogues Concerning Natural Religion* (1779). Whitehead’s foray into natural theology is an attempt to add another speaker to Hume’s masterpiece.³⁴ In this attempt, Whitehead again shows his occult lineage with Schelling, who sought to descend to the field of physics to ask: *How must the universe be constituted so as to give rise to moral beings*, that is, to conscious thinking, feeling, and willing organisms like ourselves?³⁵ Schelling looked to future epochs of consciousness that might give wings again to model-centric physics by putting its special knowledge back into self-consistent metaphysical context. If our consciousness of value cannot be invented whole cloth and tacked on to an otherwise uncaring physical universe, then Hume’s ontological bifurcation between facts and values must somehow be overcome. Hume’s

³⁰ Whitehead, *Modes of Thought*, 144, 166.

³¹ Whitehead, *Modes of Thought*, 105, 123.

³² Carroll, *The Big Picture*, 10.

³³ Whitehead, HL2, 215.

³⁴ Whitehead, *Process and Reality*, 343.

³⁵ Schelling, “The Oldest System-Program of German Idealism” (1797). Authorship of this short essay has been disputed, with some claiming it for Hegel. I follow Franz Rosenzweig’s original attribution of it to Schelling (see Pollock, “Franz Rosenzweig’s ‘Oldest System-Program’” (Fall 2010).

argument, that an *ought* cannot be derived from an *is*, is true enough as framed.³⁶ The frame is the Newtonian methodology for physics, which gave no hint even as to why masses should attract one another (even if in his theology Newton was happy to have God lend them a push), nor certainly how or why conscious living organisms should have arisen on this or any planet. Newton “illustrated a great philosophic truth, that a dead nature can give no reasons [and so] aims at nothing.”³⁷ In such a universe, the values of living organisms can only be a mirage, a way of talking about the gradient dissipation of complicated chemical reactions. If, however, the very essence of a physical fact is to feel and be felt, and to achieve some value “for itself, for others, and for the whole,” then each pulsation of actuality is itself the satisfaction of an aim: “Existence, in its own nature, is the upholding of value intensity.”³⁸ Only in such a cosmic context could our human conception of morals ever arise. Schelling and Whitehead’s organic realism rejects the absurd “Hume-Newton situation” inherited by Kant, which has it that all our knowledge hangs uprooted above “a barren...field of perception devoid of any data for its own interpretation.”³⁹ They turn instead to the experience of our own living body and to the intuitive modes of understanding which flow from its functional relationships with other actualities in nature.⁴⁰ As Schelling has it, we

“are not born to waste [our] mental power in conflict against the fantasy of an imaginary world, but to exert all [our] powers upon a world which has influence upon [us], lets [us] feel its forces, and upon which [we] can react. Between [us] and the world, therefore, no rift must be established.”⁴¹

Perhaps the most significant challenge facing process philosophers aiming to transform the self-understanding of the physical sciences is establishing the disciplinary distinction between physics as such and metaphysical interpretations of physics. While there are a few self-consistent positivists, most physicists—particularly those interested in communicating the findings of their discipline to the public—do not distinguish between physics and metaphysics. Those who do tend to dismiss the latter as entirely irrelevant to their work, or worse, as a prescientific holdover best relegated to history books. “At this moment,” Whitehead wrote late in his life, “scientists and skeptics are the leading dogmatists. Advance in detail is admitted: fundamental novelty is barred. This dogmatic common sense is the death of philosophic adventure.”⁴² I’ve chosen to engage with Carroll’s book because he bucks the trend by acknowledging the important role of philosophy in scientific discourse, even if in the end he makes the case that physicalism is the most likely ontology.⁴³ Still, the vast majority of popular treatments of contemporary physics

³⁶ See Hume, *A treatise of human nature* (1739/1978), 469.

³⁷ Whitehead, *Modes of Thought*, 135.

³⁸ Whitehead, *Modes of Thought*, 111.

³⁹ Whitehead, *Modes of Thought*, 135.

⁴⁰ Whitehead, *Modes of Thought*, 115.

⁴¹ Schelling, *Ideas for a Philosophy of Nature*, 10-11.

⁴² Whitehead, *Essays in Science and Philosophy*, 92.

⁴³ As an epistemological tool for comparing various physical models, the Bayesian reasoning defended by Carroll may be of great use. But the application of Bayesian inference to questions of ontology and metaphysics leads to an accumulation of puzzling questions regarding the grounds for judgments of probabilities, statistical or otherwise (see Whitehead, *Process and Reality*, 201ff; Carroll, *The Big Picture*, 69ff). On Whitehead’s reading, the grounds for a statistical judgment of probability cannot itself be another judgment of probability. All statistical judgments thus presuppose the intuitive givenness of a finite ground, namely, the nexus of the actual world with its enviroing layers of social order as prehended by the judging subject. Whitehead also introduces a form of non-statistical

simply equate physical science with physicalist metaphysics. Philosophers attempting to offer alternative metaphysical interpretations are asked for experimental evidence, as though physicalism had somehow already been experimentally verified. Such attitudes neglect one of the most important lessons of the history of science, “that false interpretations of observed facts enter into the records of their observation.”⁴⁴ The metaphysician’s role is not to perform scientific experiments but to interpret and generalize the findings of the special sciences in pursuit of deeper coherence and broader experiential applicability. Often, this adventure in generalization requires that the metaphysician criticize abstractions arising from the special sciences whenever they succumb to logical contradiction or are overextended beyond their proper scope of application, thus proving to be inadequate relative to the deliverances of concrete experience.⁴⁵

At this point another partial analogy to Kant’s book can be made. *Die Religion* was censured by the Prussian king for challenging the authority of the church on matters of salvation. Kant defended himself in his preface by marking a distinction between biblical theology and philosophical theology: the former, concerned with the care of souls, should not venture incursions into the latter, which is charged with the care of the sciences. Citing the case of Galileo as an example of religious officials trespassing into astronomy before even examining the evidence, he argues that philosophy and the special sciences under its care must remain free to pursue their paths of inquiry guided only by the limits of human understanding. He adds that, “were the biblical theologian to consider having absolutely nothing to do wherever possible with reason in things religious, we can easily foresee on which side the loss would be; for a religion that rashly declares war on reason will not long endure against it.”⁴⁶

Despite the profound metaphysical intuitions of a number of early twentieth century physicists, subsequent generations have come to prefer operationalist calculation over imaginative speculation, having as little to do as possible with philosophy in things scientific. Despite dreams of grand unification, an impartial review of the fragmentary and muddled state of contemporary physical theories suggests that a natural science that rashly declares war on philosophy will not long endure without it. Of course, as Whitehead admitted, “it is always possible to work oneself into a state of complete contentment with an ultimate irrationality.”⁴⁷ Whitehead’s admonition is as though tailor-made for Nobel prize winning physicist Richard Feynman, who several decades later would introduce his book on quantum electrodynamics with the following paean to absurdity:

“It is not a question of whether a theory is philosophically delightful, or easy to understand, or perfectly reasonable from the point of view of common sense. The

judgment of probability that “depends upon the fundamental graduation of appetitions which lies at the base of things” (*Process and Reality*, 207).

⁴⁴ Whitehead, *Process and Reality*, 9.

⁴⁵ Whitehead, *Process and Reality*, 13: “Whatever is found in ‘practice’ must lie within the scope of the metaphysical description. When the description fails to include the ‘practice,’ the metaphysics is inadequate and requires revision. There can be no appeal to practice to supplement metaphysics, so long as we remain contented with our metaphysical doctrines. Metaphysics is nothing but the description of the generalities which apply to all the details of practice.”

⁴⁶ Kant, *Religion Within the Bounds of Reason Alone*, 38 (6:10).

⁴⁷ Whitehead, *Modes of Thought*, 148.

theory of quantum electrodynamics describes Nature as absurd from the point of view of common sense. And it agrees fully with experiment. So I hope you can accept Nature as She is: absurd. I'm going to have fun telling you about this absurdity, because I find it delightful."⁴⁸

Feynman's attitude is reminiscent of the statement attributed to the early Church father Tertullian: "Credo quia absurdum"/"I believe because it is absurd."⁴⁹

A final analogy concerns Kant's brief aside on the nature of feelings in *Die Religion*, a subject he treats in somewhat greater detail in his earlier book, the *Critique of Judgment* (1790). This time the analogy is negative, since Kant's dismissive treatment of feeling in matters of both science and religion makes clear where Schelling and Whitehead's radical empiricism diverges from Kantian rationalism. In the course of an argument about how to rationally interpret the moral significance of scripture, Kant writes:

"...just as we cannot derive or convey the recognition of laws, and that they are moral, on the basis of any sort of feeling, equally so and even less can we derive or convey on the basis of a feeling sure evidence of a direct divine influence. ...Feeling is private to each individual...it teaches absolutely nothing but only contains the manner in which a subject is affected as regards his pleasure or displeasure, and no cognition whatever can be based on this."⁵⁰

The Metaphysics of Prehension

Contrary to Kant, for whom nothing could be more irrelevant to the study of the physical world than feelings, Whitehead returns to Hume's classical statement of empiricist epistemology—that "it is impossible for us to *think* of any thing, which we have not antecedently *felt*, either by our external or internal senses"⁵¹—and radicalizes it into a panexperientialist ontology. For Whitehead, feeling—or "prehension," in the technical vocabulary of his categorical scheme—provides the very sinews of causal connection throughout nature. Prehension is given a dipolar structure in Whitehead's account of concrescence, with both physical and conceptual phases for feeling the variety of forms of data available for objectification. These forms include feelings of past actualities, of eternal possibilities, and of hybrid contrasts between actualities and possibilities, also termed "propositional feelings." The doctrine of prehension is not merely a definitional difference but a crucial metaphysical disjunction. Both Hume and Kant affirmed the sensationalist doctrine of perception and the attendant doctrine of the objective world as a theoretical construct from purely subjective experience.⁵² Thus there is no equivalent mediating concept in either classical empiricism or transcendentalism that might put the conscious human knower in touch with the energetic activities abstractly described by the known laws of physics. Whitehead's theory of prehension embodies his protest against the bifurcated interpretation of

⁴⁸ Feynman, *Quantum Electrodynamics*, 10.

⁴⁹ This precise statement is a misattribution, but the sentiment is not in dispute. The original context of Tertullian's statement was as a response to those who found the fact that the Son of God had become flesh and died only to rise again incredible. It would appear that he intended to place such claims in the light of Paul's statements in 1 Corinthians (1:17-31) that what humans deem foolish is wisdom in God's eyes.

⁵⁰ Kant, *Religion Within the Bounds of Reason Alone*, 121 (6:114).

⁵¹ Hume, *Enquiry Concerning Human Understanding*, 7.4, SBN 62.

⁵² Whitehead, *Process and Reality*, xiii.

nature plaguing so much modern philosophy and science.⁵³ The bifurcation of nature not only separates the objective data of perception from our subjective emotional response to it, it dissociates this data and our responses from the vacuous forces that are supposed to be at work determining everything behind the scenes, leaving no room in the universe for experience, much less purposive action.⁵⁴

The very concept of “force”—which has proven so irreplaceable to physicists in their study of everything from protons to sand grains to galaxies—emerges from and gains its meaning only by continual reference to our *feelings* of attraction and repulsion, of being lashed or lured by the insistent presence of a world around (including that most intimate part of the physical environment called our body). As Schelling, speaking to Newtonian physicists, wrote in his *Ideas for a Philosophy of Nature* (1797):

“you can in no way make intelligible what a force might be independent of you. For force as such makes itself known only to your *feeling*. Yet feeling alone gives you no objective concepts. At the same time you make objective use of those forces. For you explain the movement of celestial bodies—*universal gravitation*—by forces of attraction and maintain that in this...you have [a physical ground of explanation for] these phenomena.”⁵⁵

In point of fact, experience can grant us no such physical ground of explanation, if by “physical” is meant the Cartesian idea of *res extensa*, i.e., a “barren extensive universe” of mute matter in motion set ontologically apart from the organic experience of our living bodies.⁵⁶ As Whitehead put it, echoing Schelling:

“There is nothing in the real world which is merely an inert fact. Every reality is there for feeling: it promotes feeling; and it is felt. Also there is nothing which belongs merely to the privacy of feeling of one individual actuality. All origination is private. But what has been thus originated, publicly pervades the world.”⁵⁷

All our scientific knowledge of tiny quarks and distant galaxies hits its mark (if it does), not because a disembodied mind has correctly deduced the transcendental categories determining a merely apparent nature, nor because all the mathematical symmetries determining some supposedly mind-independent material stuff have finally been ironed out, but because our organism (equipped with its world-wide network of mathematical symbols, detectors, satellites, computers, and trustworthy fellow researchers) has succeeded in translating the *lines of force* at work in models of the universe into the *feelings of life* at work within ourselves. All our knowledge, no matter how abstract or formal, must make its final appeal in the open field of experience, since the courtroom of Kantian Reason, having disavowed the reality of the facts of feeling involved in all its acts of knowing, has as a result been cut off from its only means of

⁵³ Whitehead, *Process and Reality*, 289.

⁵⁴ Whitehead, *Process and Reality*, 290.

⁵⁵ Schelling, *Ideas for a Philosophy of Nature*, 18.

⁵⁶ Whitehead, *Process and Reality*, 122.

⁵⁷ Whitehead, *Process and Reality*, 310.

concrete relation with nature. Kant's Transcendental Aesthetic acknowledges the essential role of inner and outer forms of intuition in the determination of scientific knowledge of physical objects, but his analysis amounts to a "distorted fragment of what should have been his main topic," since in the broader context of his critical idealism, experience is still understood to be the product of the schematization of higher modes of human thought, rather than the reception of vector feelings from an actual world beyond.⁵⁸ What good is a rational judge if the provenance of the evidence considered is an unknown and non-experienceable X or thing in itself?⁵⁹

If everything were really floating in abstract geometric spacetime or wave matrices, science could never follow the threads of actual experience, could never arrive at the mutual immanence of a truly de-idealized concrete physicality. The universe is not a bloodless dance of numbers. "Real facts are happening."⁶⁰ Whitehead and Schelling's organic realism refuses to shut up and calculate; instead, it infuses equations about space-time and matter-energy with physical purposes and vector feelings: "the philosophy of organism attributes 'feeling' throughout the actual world," basing this doctrine on the fact that we are directly conscious of a feeling element in ourselves.⁶¹ Presumably we are part of the universe, feelings and all.

The physical world is thus reimagined as a nexus pervaded by expressive and prehensive "vector feelings...derived from the past and...merging into the future."⁶² Physical science becomes "the science investigating spatio-temporal and quantitative characteristics of simple physical feelings"⁶³, at least those belonging to our cosmic epoch and that we have thus far managed to irradiate with consciousness. Rather than conceiving of occasions of experience like bits of matter, simply located in a given space at a given instant in time, Whitehead turns the mechanistic image of the cosmos inside out: spacetime metrics are reinterpreted as abstractions expressing the systematic relations that form the actual world into a community of subject-superjects⁶⁴; the wave function is reinterpreted as a description of the penumbra of possibilities available for actualization in each concrescent occasion⁶⁵. It is a mistake to imagine that spacetime is already there waiting for something to happen, as if the real concrete activities of nature had to enter into and occupy an abstraction.⁶⁶ There is no such thing as "empty space" in contemporary physics, the idea of such being nothing more than "the ghost of transition."⁶⁷

Nature is a network of vector feelings, a field of internally related feelers, and the laws of physics are systematic constraints on possibility describing the most widespread probabilistic patterns through which subject-superjects have cumulatively transacted.⁶⁸ Time is not the

⁵⁸ *Process and Reality*, 113).

⁵⁹ Kant, *Critique of Pure Reason*, 142/B13; 233/A109.

⁶⁰ Whitehead, *Modes of Thought*, 144.

⁶¹ Whitehead, *Process and Reality*, 177.

⁶² Whitehead, *Process and Reality*, 163.

⁶³ Whitehead, *Process and Reality*, 238.

⁶⁴ Whitehead: "Process is deeper than spacetime—spacetime is a particular mode of process: it is process under the form of spatialized retention and temporal passage—the cognitive process is a reenvisioning, from the standpoint of a wider experience, of the spatial temporal process" (HL1 147).

⁶⁵ See Epperson, Michael. *Quantum Mechanics and the Philosophy of Alfred North Whitehead* (2004).

⁶⁶ Whitehead, HL2, 127.

⁶⁷ Whitehead, *Modes of Thought*, 96.

⁶⁸ Crucially, the internal relations among feelers are cumulative or serial, caught in an asymmetric, transitive, and irreflexive genetic process, as Bradley describes it ("Act, Event, Series," 242).

reproduction of the same but a cumulation or creative advance, whereby the past is preserved, included, and transcended by new bonds of feeling achieved by novel actualities. “Accordingly the ultimate physical entities for physical science are always vectors indicating transference.”⁶⁹

Scientific Modeling as Qualified Propositional Feelings⁷⁰

Whitehead reminds those who would hypostatize a particular spacetime geometry or quantum density matrix by equating such models with our actual physical environment that

“Every statement about the geometrical relationships of physical bodies in the world is ultimately referable to certain definite human bodies as origins of reference. A traveler, who has lost his way, should not ask, Where am I? What he really wants to know is, Where are the other places? He has got his own body, but he has lost them.”⁷¹

In other words, our hypothetical models about the world are preceded by and derive their meaning from our actual affective embodiment within “a buzzing world, amid a democracy of fellow creatures.”⁷² The adjudication of scientific models can be classed among the most complex forms of prehension defined by Whitehead, constituting a species of “intellectual feelings.”⁷³ Contrary to the dualistic Cartesian onto-epistemology upon which modern science was founded, and convergent with Schelling’s insight into the inseparability of mind and matter in a self-organizing universe⁷⁴, Whitehead’s philosophy of organism “abolishes the detached mind”:

“Mental activity is one of the modes of feeling belonging to all actual entities in some degree, but only amounting to conscious intellectuality in some actual entities. This higher grade of mental activity is the intellectual self-analysis of the entity in an earlier stage of incompleteness.”⁷⁵

Conscious intellectual feelings, as a form of self-analysis, presuppose earlier phases of prehension within a concurring occasion of experience. Most important are the “propositional feelings,” which effect a felt contrast between something physically indicated (e.g., that which is measured) and something mentally conceived (e.g., a mathematical pattern). The former, physical, term in this contrast is an actual entity or nexus of entities in the past of the occasion considering the proposition, while the latter, mental, term is a possibility or possibilities being predicated of that entity or nexus that may or may not be true of them in the subjective present and/or superjective future. In Whitehead’s terms, the objects of propositional feelings are “matters of fact in potential determination,” otherwise known as “theories.”⁷⁶ The vast majority of propositional feelings in the universe arise and are transmitted below the level of self-conscious attention, acting as “lures for feeling” in still mostly habit-bound physical processes.

⁶⁹ Whitehead, *Process and Reality*, 283.

⁷⁰ Thanks is due to Ben Snyder for his helpful critical comments on an earlier draft of this section.

⁷¹ Whitehead, *Process and Reality*, 170.

⁷² Whitehead, *Process and Reality*, 50.

⁷³ Whitehead, *Process and Reality*, 266.

⁷⁴ Schelling, *Ideas for a Philosophy of Nature*, 35.

⁷⁵ Whitehead, *Process and Reality*, 56.

⁷⁶ Whitehead, *Process and Reality*, 22.

Whitehead distinguishes between proper propositions and the meager contrasts achieved, for example, in the vibratory rhythms associated with all physical energy. But even in the relatively simple occasions of experience described by the equations of physics, there are already “lures for contrast”⁷⁷ driving the universe’s creative advance into novelty, and “a felt contrary is [already] consciousness in germ”⁷⁸. In biological organisms down to the single-cell level, rhythm remains of dominant importance, but propositional feelings become intense enough as sources of novelty that mathematical equations are no longer particularly useful for predicting their behavior. Biological organisms, while fully embedded in and interwoven with their environments, are capable of deciding to actualize possibilities not already given in that environment. In other words, they are not passively shaped by an environment but, by prehending and deciding upon propositions, they are able to actively create their own environments. To acknowledge the emergence of life out of the energetic activity of physics and chemistry is also to acknowledge that, having reached its living phase, intelligent minds now play an outsized role in the universe.⁷⁹ Even those propositions complex and intense enough to rise into the consciousness of highly evolved animals or the self-consciousness of human beings are mostly not of the strictly logical or scientific sort. Rather, they function as pragmatic interventions, aesthetic appreciations, religious emotions, passing thoughts about the past or intuitions about the future, or as daydreams: while on a walk we see some large slabs of stone protruding from the sand and are reminded of the ruin in Shelley’s poem “Ozymandias.”

In the case of the value propositions of religious scripture or the aesthetic propositions of imaginative literature, the question of their truth or falsity does not usually arise.⁸⁰ What matters is the immediate incitement of goodness or beauty in experience. True and false only become important in the case of logical judgments and scientific hypotheses. The syllogisms of logicians and models entertained by physical scientists are at the far end of the spectrum of feeling in terms of their complication, abstraction, and refinement.

“Intellectual feelings,” then, involve an integrative recursion whereby a propositional feeling is compared with the indicative physical feeling from which it is partly derived.⁸¹ In Whitehead’s terms, an intellectual feeling is

“the contrast between the affirmation of an objectified fact in the physical feeling, and the mere potentiality, which is the negation of such affirmation, in the propositional feeling. It is the contrast between ‘*in fact*’ and ‘*might be*,’ in respect to particular instances in *this* actual world.”⁸²

The “affirmation-negation contrast” achieved by intellectual feelings is Whitehead’s technical definition of consciousness. On Whitehead’s reading, conscious physicists entertaining and evaluating scientific hypotheses are engaged in a form of suspended “as if” reasoning that he

⁷⁷ Whitehead, *Process and Reality*, 277.

⁷⁸ Whitehead, *Process and Reality*, 188.

⁷⁹ As Whitehead put it, “the evolutionary use of intelligence is that it enables the individual to profit by error without being slaughtered by it” (*Process and Reality*, 168).

⁸⁰ Whitehead, *Process and Reality*, 185.

⁸¹ Whitehead, *Process and Reality*, 266.

⁸² Whitehead, *Process and Reality*, 267.

refers to as “coordinate analysis.”⁸³ This mode of reasoning considers those aspects of the universe for which the mental pole of concrescence, while inevitably involved in every process, is not immediately relevant. The metaphysician, in contrast, must also engage in what Whitehead calls “genetic analysis,” a mode of reasoning which considers the interplay of both physical and mental poles in the organic process of concrescence. The degree to which the novelty intensifying mental pole is relevant can only be an empirical question that each special scientific inquiry must determine in its own case.⁸⁴ Coordinate analysis thus divides the living process of cosmic becoming so as to hypothetically isolate the mathematizable, measurable aspects of the highly repetitive physical pole. The modern physical sciences have had tremendous success treating the universe under an abstraction in this way. But as the pronouncements of Carroll and other popularizers of physics-as-physicalism make clear, the tendency has been to forcibly conflate abstract models with concrete reality.

The process philosophical position is that the truth of even the most successful (i.e., predictively accurate) scientific hypotheses in physics must be qualified. *Unqualified scientific propositions about the real physical universe are always false*, since it is only through the application of an abstract method of analysis to concrete experience that a mathematical model of the physical is extracted from the full concreteness of cosmic becoming, which always includes the immeasurable and incalculable originative urges of the mental pole. Even in the study of low-grade physical occasions, particle physicists cannot neglect the extent to which their own capacities for sensory discrimination, technological experimentation, and theoretical speculation are part of the universe they are describing, presupposed in every model they might propose.⁸⁵

Whitehead found it necessary to remind his colleagues that “thought and scientific activity are themselves elements in nature.”⁸⁶ The point of these qualifications is not to deny the possibility of scientific truth: “I assume as an axiom that science is not a fairy tale.”⁸⁷ Whitehead was a realist who defended some version of the correspondence theory of truth. The conformity or non-conformity of theoretical propositions to a given nexus of physical occasions can be tested. But as his is an *organic* realism, Whitehead adds that scientific judgments of the truth and falsehood of such propositions are “concerned with a conformity of two components within one experience.”⁸⁸ In other words, such judgments are correct or incorrect regarding the experience of *that* subject. Thus, Whitehead’s is also a coherence theory. The occasional basis of scientific judgment implies a pluralistic universe, whereby “the world expands through recurrent unifications of itself, each, by the addition of itself, automatically recreating the multiplicity anew.”⁸⁹ This is not the whole story, however. The possibility of impartial truth, or truth that

⁸³ Whitehead, *Process and Reality*, 283.

⁸⁴ Whitehead, *Process and Reality*, 285.

⁸⁵ In this paper, the identification of scientific modeling with intellectual feelings should be understood to refer specifically to the experience of scientists actively evaluating models in the investigation of some aspect of the physical world. Per Whitehead’s “ontological principle,” the notion of free-floating propositions is to be avoided. For propositions to function in an act of knowing, or as reasons or causal contributions to cosmic process, they must be actively felt. Feelings are the vehicles of propositions; sans feelings, ‘the rest is silence’ (*Process and Reality*, 40, 43). Mathematical symbolism, the precision manufacture of measuring instruments, and clear conceptual articulation allows scientists to be reasonably sure they are feeling the same proposition.

⁸⁶ Whitehead, HL2, 244.

⁸⁷ Whitehead, *The Concept of Nature*, 40.

⁸⁸ Whitehead, *Process and Reality*, 190-191.

⁸⁹ Whitehead, *Process and Reality*, 286.

holds independent of a particular subject of experience, is admitted by Whitehead by way of his doctrine of the world as a medium for the orderly transmission of influences. This doctrine establishes a scheme of necessary and universal relationality within and among every occasion, gathering their indefinite multiplicity within the solidarity of what Whitehead calls “the extensive continuum.”⁹⁰ Genetic and coordinate modes of analysis are thereby integrated as complementary descriptions of two aspects of one and the same cosmic process.

Conclusion: Making Sense of Physical Knowledge

The bifurcation of nature plaguing modern science has been fatal to the search for an adequate cosmology inclusive not only of known physics and of the epistemic conditions of physical knowledge, but also of the broader psycho-spiritual presuppositions of civilized life. We find ourselves living in a universe capable of theorizing about its own conditions of possibility. The power of the mechanistic theory has been alluring enough that large swaths of the educated world now imagine themselves as little more than complicated blobs of mud on an unremarkable rock orbiting a middle-aged ball of plasma in a third-rate galaxy tangled with trillions of others all rushing away from one another for no reason whatsoever into an infinite abyss of nothingness. On some level it is a compelling story, a call to adventure into the modern scientific hero’s journey. In Carroll’s terms, this journey involves the *ex nihilo* construction of new meaning and values so as to catch up a still basically dogmatic religious cultural outlook to the level of our best scientific ontology (for him, physicalism): “we need to make our peace with a universe that doesn’t care what we do, and take pride in the fact that we care anyway” (418).

Carroll complains about philosophers who imagine that the existence of consciousness requires something more than the basic ontology implied by the laws of physics and chemistry. He claims this would grant consciousness a transcendent supernatural status beyond the physical world (348), which for Carroll could only mean proposing new laws of physics. The philosophy of organism does not seek to make amendments to highly refined models of physical law (though the history of science shows its progress depends on revolutionary shifts ushering in new, more inclusive physical relations). Process philosophers seek instead to metaphysically recontextualize natural scientific knowledge.⁹¹ Consciousness does not transcend nature, *because nature was always already seeded with mental potential*. The models of physics make astoundingly accurate predictions enabling us to build machines increasingly indistinguishable from magic. But predictive models and their technological applications tell us nothing about the concrete existence of real events in the physical world unless in some way or another they can be translated into descriptions of actual occasions of experience. Otherwise our best models amount to little more than a kind of “dashboard knowledge,” to use Owen Barfield’s helpful turn of

⁹⁰ Whitehead, *Process and Reality*, 284-286. I should add here that Whitehead’s understanding of scientific truth ultimately rests on his secularized conception of a dipolar God’s function in the universe: “there can be no determinate truth, correlating impartially the partial experiences of many actual entities, apart from one actual entity to which it can be referred” (*Process and Reality*, 13), that one actual entity being God. Suffice it to say that Whitehead, like nearly every scientist who inaugurated the scientific revolution, did not believe it was rational to imagine a universe exemplifying such profound mathematical harmonies might have taken shape merely as a matter of chance. In other words, both historically and metaphysically, natural science has theological implications. Of course, Whitehead’s process theology differs in dramatic ways from the deism presupposed by Descartes, Newton, and Kant. But these theological concerns take us beyond the scope of the present study.

⁹¹ See for example Timothy Eastman, *Untying the Gordian Knot: Process, Reality, and Context* (2020). See also the present author’s review in *Process Studies*, Vol. 51, Iss. 2 (2022).

phrase.⁹² If the accuracy of mathematical modeling tells us anything about what is truly intrinsic to the universe, it is that it includes mathematical physicists, and thus mentality! Importantly, physical knowledge also tells us that reality is not just a stage-play in the mind. Real facts are happening.

If our own thinking, feeling, and willing are themselves elements in nature (i.e., among the real facts that are happening), are we not justified in imagining that our human obstinance in the face of the great moral and spiritual uncertainty of recent centuries is itself an expression of the same Cosmic Eros out of which we originate? “Behind all our thought stands nature accepting or rejecting the creative activity of her children.”⁹³ Human self-consciousness—whether scientific, religious, or artistic; whether physical, moral, or aesthetic in orientation—“concentrates...in a high degree the conceptual feelings inherent throughout nature,” thus allowing us to participate in modifying what we emerge from.⁹⁴ Far from passive spectators, we are creative participants not only in the production of more vital, dynamic, and harmonious consciousness and culture, but in cosmogenesis itself. The panpsychist organic realism proposed in this essay does not itself resolve the moral quandaries associated with human suffering and death, which remain ineluctable ingredients even in an ever-living cosmos. But it may provide some reason to wonder whether Hamlet’s dying words—“The rest is silence”⁹⁵—tell the whole story.

For the pre-critical Kant, there could be no better proof of God than the mechanistic theory of the universe.⁹⁶ That the masses and forces of the physical world should evince such mathematical harmony; that according to a few simple laws of attraction and repulsion, the whole of the heavenly spectacle of planets, stars, and galaxies could be brought into existence out of chaos before our mind’s eye; this cosmic vision, for Kant, was a new revelation, a new chapter of divine intervention in human history ushering in an Age of Reason. Kant would later find it necessary “to limit knowledge in order to leave room for faith,”⁹⁷ but several centuries later it would appear that knowledge of nature has far outpaced our sense of the moral significance of human freedom.⁹⁸ The physicalist cosmology describing a mindless but mathematically unified universe’s purposeless tumble from Big Bang to heat death is understood by many to be a demonstration of Ultimate Irrationality. Physicists wax atheological about the miracle of

⁹² See Barfield, *Saving the Appearances*, 55: “Take a clever boy, who knows nothing about the principle of internal combustion or the inside of an engine, and leave him inside a motor-car, first telling him to move the various knobs, switches and levers about and see what happens. If no disaster supervenes, he will end by finding himself able to drive the car. It will then be true to say that he knows how to drive the car; but untrue to say that he knows the car. As to that, the most we could say would be that he has an ‘operative’ knowledge of it—because for operation all that is required is a good empirical acquaintance with the dashboard and the pedals. Whatever we say, it is obvious that what he has is very different from the knowledge of someone else, who has studied mechanics, internal combustion and the construction of motor cars, though he had perhaps never driven a car in his life, and is perhaps too nervous to try. Now whether or no there is another kind of knowledge of nature which corresponds to ‘engine-knowledge’ in the analogy, it seems that, if the first view of the nature of scientific theory is accepted, the kind of knowledge aimed at by science must be, in effect, what I will call ‘dashboard-knowledge.’”

⁹³ Whitehead, HL2, 244.

⁹⁴ Whitehead, HL2, 174.

⁹⁵ Shakespeare, *Hamlet*, Act V, Scene 2, line 343.

⁹⁶ Kant, *Universal Natural History and Theory of the Heavens*, 15.

⁹⁷ Kant, *Critique of Pure Reason*, B xxx.

⁹⁸ See the present author’s chapter “The Nature of Human Freedom” in *The Re-Emergence of Schelling: Philosophy in a Time of Emergency* (2014). Available online: <https://footnotes2plato.com/2018/10/26/schellings-philosophy-of-freedom/>

mathematical symmetry, but their physicalist interpretations can only function to “reduce modern physics to a sort of mystic chant over an unintelligible Universe.”⁹⁹ Acceptance of nature’s bottomless absurdity has dramatically curtailed the moral imagination of large swaths of our species. It has also left natural science in a complete muddle regarding its own onto-epistemological presuppositions as regards the relation of observation, theory, and practice.¹⁰⁰ Another cosmology is possible. It might even make sense.

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⁹⁹ Whitehead, *Modes of Thought*, 136.

¹⁰⁰ Whitehead’s solution to the modern scientific muddle is the invention of the onto-epistemic category of prehension: “All metaphysical theories which admit a disjunction between the component elements of individual experience on the one hand, and on the other hand the component elements of the external world, must inevitably run into difficulties over the truth and falsehood of propositions, and over the grounds for judgment. The former difficulty is metaphysical, the latter epistemological. But all difficulties as to first principles are only camouflaged metaphysical difficulties. Thus also the epistemological difficulty is only solvable by an appeal to ontology” (*Process and Reality*, 189).

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