Clarifying the Concept of Self: An Empirical–Axiomatic Framework

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Abstract

The concept of the self is often treated either as a metaphysical primitive or as a uniquely human phenomenon inseparable from consciousness. Both approaches generate deep and persistent confusion. In this paper, I offer a clarification not a new metaphysical theory of the concept of self by grounding it firmly in physical reality and in actual scientific practice. The central claim is simple but easily misunderstood: the self is always a physical system composed of physical constituents, while our understanding of that system is mediated through abstract models. To make this precise, the paper distinguishes between empirical selves, which are physically instantiated systems that exist independently of our descriptions, and axiomatic selves, which are model-level representations constructed in abstract space. Experiential selfhood, including the human sense of "I," is treated as a particular axiomatic self instantiated in neural structure one model among many for the same empirical system. No additional ontological category of self is introduced. The framework is illustrated through detailed parallel with a physical case study of light, where a single empirical phenomenon (light) admits multiple non-equivalent models (ray, wave, particle, quantum field). Just as wave and particle models are both valid representations of light without ontological conflict, biological and experiential models are both valid representations of the human organism. A major refinement concerns the notion of a physical system itself: systems are not intrinsically well-defined in nature but are selected as objects of study, becoming well-defined relative to the success of modeling. By making these distinctions explicit and illustrating them through systematic comparison, this framework dissolves long-standing confusions about identity, persistence, consciousness, anthropocentrism, and the mind-body problem.

Keywords: Light, Models of Light, Empirical Facts, Self, Empirical Self, Axiomatic Self, Physical Systems, Physical Constituents, Matter, Standard Model of Particle Physics, Hierarchy of Physical Reality, Scientific Modeling, Empirical–Axiomatic Framework, Experiential Self, Enlightenable Self, Space–Time, Emergence, Philosophy of Science.

1 Motivation and the Source of Confusion

The question "What is the self?" arises most forcefully from human experience. I speak, I act, I remember, and I refer to myself as "I." This immediacy creates a powerful intuition that the self must be something special something over and above ordinary physical systems. At the same time, scientific practice treats humans, animals, gases, trees, planets, and galaxies uniformly as physical systems, without introducing any special ontological category for persons. The apparent conflict between lived experience and scientific description motivates this paper.

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The aim is neither to deny experience nor to elevate it metaphysically, but to place it correctly within a disciplined conceptual framework. The experiential self the "I" that each person knows directly is real. But it is not ontologically fundamental, not a separate substance, and not mysterious. It is one way of modeling the same physical system that biology, neuroscience, and physics also model, each in their own terms.

Much of the confusion surrounding the self arises from three interconnected mistakes. First, physical existence is often conflated with representation, leading people to treat models or descriptions as if they were the things themselves. Second, it is commonly assumed that systems are uniquely and intrinsically defined by nature, rather than selected for study. Third, experiential selfhood is often treated as ontologically independent, as if the feeling of "I" required the existence of a special inner entity separate from the physical organism. This paper addresses these mistakes directly by drawing on the same conceptual structure used successfully in physics to handle multiple models of a single physical phenomenon. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c]

2 What This Framework Is and What It Is Not

This framework is a clarification of how the concept of self operates within scientific and philosophical reasoning. It is compatible with physics, biology, and cognitive science, and it explicitly separates physical reality from our representations of that reality. It is not a theory of consciousness, not a metaphysical account of ultimate reality, not a denial of experience, and not an anthropocentric doctrine. The framework is methodological rather than speculative: it tells us how to place concepts correctly, not what the universe is ultimately made of.

Importantly, this framework does not claim novelty in its individual components. The empirical–axiomatic distinction has been developed elsewhere and applied to foundational questions in physics and philosophy of science. What is offered here is the systematic application of that same structure to the concept of self, showing that the apparent uniqueness and mystery of selfhood dissolve when subjected to the same conceptual discipline applied successfully to light, electrons, and other physical systems. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c]

3 Physical Constituents and the Clarification of "Matter"

In this framework, the concept of self must be grounded in physical reality, but without committing to an outdated or rigid notion of "matter." By matter, I do not mean classical substance, inert mass, or only massive particles. Rather, I use the term in a clarified and empirical sense: matter refers to whatever physically exists and participates in causal interactions in the world we observe. At present, our best systematic articulation of such physical existence is provided by the Standard Model of particle physics and its extensions. This includes electrons, quarks, photons, other gauge bosons, their antiparticles, and all composite structures formed from them. Importantly, massless entities such as photons are explicitly included, since they carry energy and momentum, mediate interactions, and play an essential role in how the world evolves and appears to us.

The physical world as we encounter it is organized hierarchically. At one level, we observe macroscopic systems such as rocks, trees, animals, planets, stars, and galaxies. These are composed of molecules, which are composed of atoms, which in turn are composed of electrons and nuclei. Nuclei are composed of protons and neutrons, which themselves are composed of quarks bound by gluons. This hierarchy is not merely conceptual but reflects the layered structure revealed by empirical investigation. At each level, new stable structures emerge, but none of these levels float free of the lower ones; they are physically instantiated arrangements of the same underlying constituents.

The Standard Model currently represents the deepest confirmed layer of this hierarchy. However, this framework does not claim that the Standard Model is final. It is entirely possible that electrons, quarks, and gauge bosons are themselves emergent entities arising from deeper structures, such as fields, strings, or other degrees of freedom not yet fully understood. If such deeper layers are discovered, they will simply extend the hierarchy downward. Whatever entities occupy those deeper levels, if they give rise to electrons, quarks, photons, and ultimately to atoms, organisms, and galaxies, then they too fall under what is meant here by physical constituents. In this sense, matter is not asserted as metaphysically fundamental; it is used as an empirical anchor tied to the hierarchy of physical reality as it reveals itself through science.

Equally important is what does not count as a physical constituent. Quantities such as energy, temperature, entropy, pressure, potential, or current are not constituents of reality by themselves. They are descriptive or relational quantities that arise from the behavior and interactions of physical constituents. Energy, for example, is always energy of some physical system or configuration; it does not exist independently as a self standing entity. These quantities belong to models and descriptions, not to the inventory of what physically exists.

Space–time occupies a distinct role in this framework. Space–time is treated as the physical background structure within which physical constituents exist, interact, and evolve. It provides spatial extension and temporal ordering and is dynamically influenced by matter and energy, as described by modern physics. However, space–time is not treated here as a constituent in the same sense as particles or fields that compose material systems. Rather, it functions as the structural arena of physical reality, not as a system composed of parts in the way matter-based systems are. For the purposes of clarifying the concept of self, space–time is therefore taken as the background condition of physical existence rather than as something that itself possesses selfhood.

With these clarifications in place, the conclusion of this section can be stated precisely. When this framework says that the self is composed of matter, it means that the self is composed of physically instantiated constituents drawn from the hierarchy of physical reality, as currently described by the Standard Model and whatever deeper theories may replace or extend it. This explicitly includes electrons, quarks, photons, and all higher-level structures built from them; it explicitly excludes purely descriptive quantities; and it treats space–time as the physical background rather than as a constituent system. In this way, the concept of self remains firmly anchored in empirical reality while remaining open to future developments in our understanding of the fundamental structure of the world. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c, Carroll, 2004, Tong, 2012, Weinberg, 1995, Wilczek, 2008]

4 Systems as Objects of Study

A crucial clarification concerns the notion of a system itself. Systems are not intrinsically given by nature. Nature does not come labeled with boundaries indicating where one system ends and another begins. Instead, a system is whatever portion of physical reality is taken as the object of study. This selection is guided by observation, interaction, causal boundaries, and explanatory interest, rather than by an objective partition already present in the world.

For example, when we study a gas in a container, we treat that gas as a system. We could, in principle, study a smaller portion (a few molecules) or a larger one (the room containing the container), but we select the gas in container because it admits successful thermodynamic modeling. When we study a tree, we treat the tree as a system, though we could study individual cells, the forest ecosystem, or biochemical pathways. When I refer to myself, I treat my organism as a system, though the boundary could be drawn differently depending on explanatory purpose.

In each case, the system is not discovered as a pre-defined unit; it is selected as such. This does not make systems arbitrary or subjective. The selection is constrained by physical reality: some selections yield stable models with predictive success, while others do not. A well-chosen system is one for which coherent axiomatic models can be constructed.

Importantly, systems are not defined by fixed material constituents. Open systems such as organisms, rivers, and planetary atmospheres continuously exchange matter and energy with their surroundings, yet they are paradigmatic systems in science. What makes them systems is not constituent persistence but organizational coherence and causal integration. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c]

5 A Case Study: Light as Empirical Self and Axiomatic Selves

Before analyzing the self directly, it is instructive to examine a parallel case from physics where the empirical–axiomatic distinction is already well-established and successfully applied: the case of light.

5.1 The Empirical Self of Light

Light exists as a physical phenomenon independently of how we describe it. It propagates through space, interacts with matter, produces observable effects, and constrains which models of it can succeed. This is what is meant by the empirical self of light: light as it actually exists and behaves in reality, prior to and independent of any theoretical representation.

The empirical self of light is unique. There is only one light, one physical phenomenon, even though we describe it in multiple incompatible seeming ways. All experiments with light from geometric optics to quantum optics interact with this same empirical self.

5.2 Multiple Axiomatic Selves of Light

To understand, predict, and explain the behavior of light, physicists have constructed multiple axiomatic selves: abstract models defined by specific assumptions, equations, and domains of validity. These include:

1. **Ray (Geometrical) Optics:** Models light as traveling along well-defined paths (rays) that reflect and refract at interfaces. Successfully describes image formation, shadows, mirrors, and lenses. Fails when wavelength effects become significant (diffraction, interference).

2. **Wave Optics:** Models light as a continuous wave capable of superposition. Successfully describes interference patterns, diffraction through apertures, and polarization. Fails to account for discrete detection events or energy quantization.

3. **Classical Electromagnetism:** Models light as propagating coupled electric and magnetic fields governed by Maxwell's equations. Successfully unifies optical phenomena across the electromagnetic spectrum and accounts for radiation pressure. Fails at microscopic scales where quantum effects dominate.

4. **Particle (Photon) Model:** Models light as composed of discrete energy quanta (photons) that interact locally with matter. Successfully explains the photoelectric effect, Compton scattering, and discrete detection events. Fails to account for interference and diffraction without additional structure.

5. **Quantum Field Theory (QED):** Models light as excitations of the quantized electromagnetic field. Successfully accounts for all experimentally accessible optical phenomena, including interference, discrete detection, vacuum fluctuations, and relativistic constraints. Remains limited to regimes where quantum gravity is negligible.

5.3 Key Observations from the Light Case

Several features of this case are essential:

1. **One empirical self, multiple axiomatic selves:** All models describe the same physical phenomenon. Light itself does not change when we switch models.

2. **No model is complete:** Even quantum field theory, the most general current model, has limits. It does not account for quantum gravity or claim to be the final theory.

3. **Models coexist without contradiction:** Ray optics and wave optics are mutually inconsistent as complete descriptions, yet both remain valid within their domains. There is no wave-particle paradox once we recognize that "wave" and "particle" are features of models, not intrinsic properties of light itself.

4. **Domain of validity is crucial:** Each model succeeds in specific regimes and fails outside them. Choosing the right model depends on what aspect of light's behavior is being studied and under what conditions.

5. **Well-definedness is model-relative:** "Light in this double-slit experiment" is a well-defined system because multiple successful models apply to it. "A random collection of photons from unrelated sources across the universe" exists physically but is not well-defined as a system, because no useful models organize it.

This case study establishes the template for understanding the self. [Pawar, 2026a,Pawar, 2026b, Pawar, 2026c, van Fraassen, 1980]

6 The Empirical Self: Physical Systems as They Exist

An empirical self is a physically instantiated system that exists and evolves independently of any model or description. It belongs to empirical reality itself. An empirical self is composed of physical constituents, evolves in time, and participates in causal interactions. Its existence does not depend on whether we understand it, model it, or even recognize it as a system.

The term "empirical self" is a general designation applicable to any physical system selected for study. Depending on how system boundaries are drawn:

1. An electron can be treated as an empirical self

2. An atom can be treated as an empirical self

3. A gas cloud can be treated as an empirical self

4. A tree can be treated as an empirical self

5. A human organism can be treated as an empirical self

6. The Earth can be treated as an empirical self

7. A galaxy can be treated as an empirical self

8. The universe itself can be treated as an empirical self

The empirical self is not conscious by definition and does not presuppose experience, agency, or meaning. It is simply a physical system as it exists in reality. When applied to humans, the empirical self is the living organism the physical system composed of cells, tissues, organs, and neural circuitry as it actually exists and functions, independent of how we model or describe it.

Just as the empirical self of light is not identical to any model (not "really a wave" or "really a particle"), the empirical self of a human is not identical to any model. It is not "really biological," "really neurological," or "really experiential." It is the physical system that all these models attempt to represent. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c, Dennett, 1991, Metzinger, 2003]

7 Identity Without Fixed Constituents

A major source of confusion about the self is the assumption that identity requires fixed material constituents. Modern physics shows that this assumption is false, both at fundamental and composite levels.

At the fundamental level, quantum mechanics establishes that elementary particles of the same type are indistinguishable. There is no fact of the matter about "which" electron occupies a given orbital or "which" photon exits a beam splitter. Particle identity in the classical sense does not exist.

At the composite level, open systems continuously exchange constituents with their environment. A human body replaces nearly all of its atoms over the course of several years. A river constantly exchanges water molecules. A flame consumes fuel and expels combustion products. Despite this, we correctly recognize these as the same systems over time.

Therefore, identity must be grounded not in particle identity but in persistent organization and causal coherence. A human being remains the same empirical self because the organism maintains a coherent physical organization and pattern of interaction, not because it retains the same atoms. The same reasoning applies to rivers, flames, ecosystems, and organisms.

This insight is directly parallel to light: in quantum field theory, photons are indistinguishable excitations of the electromagnetic field. The identity of a light beam is not grounded in tracking specific photons but in the continuity of the field configuration and causal structure. Similarly, the identity of a person is grounded in organizational continuity, not constituent persistence. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c, Weinberg, 1995, von Bertalanffy, 1968, Anderson, 1972]

8 Axiomatic Selves: Models of Physical Systems

While empirical selves exist independently of our descriptions, our understanding of them is mediated through models. An axiomatic self is a model-level representation constructed in abstract space to describe, explain, or predict the behavior of an empirical self. Axiomatic selves do not exist physically; they exist as representations as abstract structures using mathematics, concepts, and formal relations to capture selected aspects of a physical system's behavior.

Just as light admits multiple axiomatic selves (ray, wave, particle, field), a human organism admits multiple axiomatic selves:

1. **Biological Axiomatic Self:** Models the organism in terms of metabolic processes, cellular organization, homeostasis, growth, and reproduction. Describes physiology, biochemistry, and developmental biology.

2. **Neurological Axiomatic Self:** Models the organism in terms of neural circuits, firing patterns, neurotransmitter dynamics, brain regions, and connectivity. Describes the physical substrate of cognition.

3. **Cognitive Axiomatic Self:** Models the organism in terms of information processing, memory systems, decision-making mechanisms, attention, and learning. Describes functional organization abstractly.

4. **Experiential Axiomatic Self:** Models the organism in terms of first-person perspective, subjective experience, the sense of "I," phenomenal consciousness, and self-representation. Describes what it is like to be this system from the inside.

5. **Social Axiomatic Self:** Models the organism in terms of roles, relationships, cultural identity, and participation in social structures. Describes personhood as socially embedded.

6. **Physical/Chemical Axiomatic Self:** Models the organism in terms of atoms, molecules, thermodynamics, and chemical reactions. Describes the system at the level of fundamental physical constituents.

7. **The enlightenable self:** The enlightenable self captures the capacity of a physical system, especially a human empirical self, to examine its own axiomatic selves, revise them, discard them, or construct new ones. This includes the ability to question one's own assumptions, reinterpret experience, and restructure understanding. Nothing mystical is being claimed here. This capacity is instantiated in physical organization, particularly in neural and cognitive structures, and it is constrained by biological, psychological, and environmental factors.

These axiomatic selves coexist for the same empirical self. None of them is identical to the empirical self itself. Just as the wave model of light is not light and the particle model of light is not light, the experiential model of a human is not the human and the biological model of a human is not the human. They are all representations. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c, Metzinger, 2003]

9 Well-Definedness as Model-Relative

A key refinement of this framework concerns the notion of well-definedness. No physical system is intrinsically well-defined in nature. A system becomes well-defined only relative to successful axiomatic modeling.

When stable models can be constructed that track the behavior of a selected system and yield reliable predictions or explanations, the system is treated as well-defined within that domain. Well-definedness is therefore explanatory and pragmatic, not ontological.

Examples:

1. A gas in a closed container is well-defined relative to thermodynamics because thermodynamic models succeed in predicting pressure, temperature, and entropy.

2. A human organism is well-defined relative to biology and neuroscience because those models capture stable regularities in growth, metabolism, cognition, and behavior.

3. An arbitrary collection such as "all atoms currently in my body plus one hydrogen atom currently in the Sun" exists physically all those atoms are real but this collection typically lacks useful axiomatic description. It is not well-defined as a system because no coherent model organizes it.

Light parallel:

"Light in this double-slit experiment" is well-defined because multiple successful models (wave optics, quantum mechanics) apply to it and make accurate predictions. "A random assortment of photons from disconnected sources scattered across spacetime" exists physically but is not well-defined as a system because no model usefully treats it as a unified object of study.

This principle applies equally to the self. A human organism is well-defined because biological, neurological, and experiential models successfully organize its behavior. The notion of self is not metaphysically fundamental but emerges from the success of these models. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c, Morgan and Morrison, 1999]

10 The Experiential Axiomatic Self: Placing the "I"

The human sense of "I" requires special clarification, not because it is ontologically unique, but because it is the aspect of selfhood most immediate to conscious experience and most liable to philosophical confusion.

10.1 What the Experiential Self Is

The experiential self is an axiomatic self a model-level representation whose content consists of first-person perspective and subjective experience. It includes:

1. The sense of "I" as a continuous subject of experience
2. Phenomenal consciousness (what it is like to see red, feel pain, hear music)
3. Ownership of mental states ("my" thoughts, "my" perceptions)
4. Autobiographical memory and narrative continuity
5. The capacity to represent both the world and the system itself

This experiential axiomatic self is not a new kind of entity and not an additional ontological category. It is a model a representational structure just as wave optics is a model of light.

10.2 Physical Instantiation in Neural Structure

Crucially, the experiential axiomatic self is physically instantiated in neural structure. It does not float free of the brain, nor does it require a non-physical substance. Specific patterns of neural activity, involving regions such as the thalamo-cortical system, default mode network, and integrated information processing mechanisms, constitute the physical realization of this model.

When we say "I experience pain," this refers to:

1. The empirical self (the organism) undergoing a specific physical process (neural activity in pain-processing regions)
2. An axiomatic self (the experiential model) that represents this process from a first-person perspective

The experiential representation is not separate from the neural activity it is instantiated in it. Just as interference patterns are not separate from light but are instantiated in light's actual behavior, the experiential "I" is not separate from the brain but is instantiated in neural organization.

10.3 One Model Among Many

The experiential axiomatic self is one model among many for the same empirical system. When a neuroscientist studies the same human organism, they construct a neurological axiomatic self that describes neural firing patterns, synaptic connections, and neurotransmitter dynamics. When a biologist studies the organism, they construct a biological axiomatic self focused on metabolism and cellular function.

These are not competing descriptions of different things. They are different models of the same physical system, each capturing different aspects and serving different explanatory purposes.

10.4 Light parallel

When studying light in a double-slit experiment:

1. Wave optics models it as an oscillating field, predicting interference patterns
2. Particle models describe discrete photon detection events
3. Quantum field theory unifies both within a more general framework

None of these models is "what light really is." Similarly:

When studying a human organism:

1. Neurology models it in terms of synaptic activity and brain regions
2. Experiential phenomenology models it in terms of "I" and conscious awareness
3. Biology models it in terms of metabolic processes

None of these models is "what the person really is."

The experiential self is not ontologically privileged. It is privileged epistemically for the experiencing subject (because it is directly accessible) and pragmatically for certain kinds of explanation (ethics, psychology, law). But it is not metaphysically fundamental. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c, Dennett, 1991]

11 Gradation of Experiential Selfhood Across Systems

Experiential selfhood is not universal. It appears in some living organisms, particularly within the animal kingdom, where neural organization supports representation, memory, and integrated control. This is a matter of physical structure, not ontological status.

1. Humans exhibit rich, complex experiential axiomatic selves, including autobiographical memory, self-reflection, linguistic self-representation, and elaborate phenomenal consciousness.
2. Mammals and birds likely exhibit experiential selfhood of varying degrees, evidenced by behavioral indicators such as pain response, memory, recognition, and flexible decision-making.
3. Simpler animals (insects, mollusks) may exhibit minimal or absent experiential selfhood, depending on neural organization. The question is empirical, not metaphysical.
4. Plants and bacteria, while empirical selves (physical systems), do not instantiate experiential axiomatic selves. They lack the neural structure required for first-person representation.
5. Rocks, rivers, and planets are empirical selves but lack any experiential dimension. They can be modeled successfully (geology, hydrology, astrophysics) without reference to experience.

This gradation is structural, not arbitrary. Just as interference patterns appear in light under specific experimental conditions (coherent sources, appropriate scale), experiential selfhood appears in physical systems under specific organizational conditions (integrated neural networks, representational capacity).

The distinction does not introduce a metaphysical divide between "conscious beings" and "mere matter." All empirical selves are physical systems composed of physical constituents. Some happen to be organized in ways that instantiate experiential models; others do not. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c]

12 Interaction and Consistency Among Multiple Axiomatic Selves

When multiple axiomatic selves represent the same empirical self, an important question arises: how do they relate to one another?

12.1 Consistency Without Reducibility

Different axiomatic selves must be mutually consistent when they make overlapping predictions, but they are not generally reducible to one another. The experiential self cannot be straightforwardly derived from the neurological self, just as wave optics cannot be straightforwardly derived from particle models without additional structure (quantum mechanics).

However, they must not contradict each other in their domains of overlap. If the experiential self reports continuous awareness during a period when the neurological self shows no coherent brain activity, one of the models has failed.

12.2 Different Explanatory Roles

Each axiomatic self serves different explanatory purposes:

1. The biological self explains metabolism, homeostasis, reproduction
2. The neurological self explains perception, motor control, neural dynamics
3. The cognitive self explains reasoning, memory, learning
4. The experiential self explains subjective perspective, qualia, the sense of "I"
5. The social self explains roles, norms, interpersonal dynamics

None can be eliminated in favor of the others without explanatory loss. Just as physics uses different models of light for different purposes (ray optics for lens design, QED for precision measurements), we use different models of the human organism for different explanatory tasks.

12.3 Experiential Priority for Certain Questions

For certain kinds of questions ethical responsibility, legal culpability, meaning-making, subjective well-being the experiential axiomatic self has practical priority. Not because it is ontologically more real, but because these questions concern the first-person perspective directly.

This does not contradict the framework. Priority for certain purposes is compatible with equality of ontological status. Ray optics has priority for designing eyeglasses, not because it is "truer" than quantum field theory, but because it is the appropriate tool for that task. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c, Morgan and Morrison, 1999]

13 Dissolution of Philosophical Problems

13.1 The Mind-Body Problem

- **Traditional formulation:** How can the physical brain (objective, material, third-person) produce or give rise to conscious mind (subjective, experiential, first-person)? These seem like fundamentally different kinds of things.
- **Dissolution within this framework:** There is no fundamental divide. There is one empirical self (the human organism) that can be modeled in multiple ways:
    1. Neurological axiomatic self: describes neural firing, synaptic activity, brain regions
    2. Experiential axiomatic self: describes first-person perspective, qualia, the sense of "I"

Both are models of the same physical system. The experiential model is instantiated in neural structure. No mysterious "production" or "emergence" of a separate substance is required.

Light parallel

How can light "be both a wave and a particle"? It cannot, if "wave" and "particle" are ontological categories. But light is neither. "Wave" and "particle" are features of models. Similarly, the human is neither "just brain states" nor "just conscious experience." Both are valid models of the same empirical self.

13.2 Personal Identity Over Time

- **Traditional problem:** What makes me the same person over time, given that my body changes, my memories shift, and my psychological states evolve?
- **Dissolution within this framework:** Identity is grounded in organizational continuity of the empirical self, not in fixed constituents or psychological content. The human organism persists as a causally coherent physical system despite constituent turnover. The experiential axiomatic self tracks this continuity through memory and narrative, but identity does not depend on the accuracy of that model.

13.3 The Hard Problem of Consciousness

- **Traditional formulation:** Even if we explain all functional and behavioral aspects of consciousness (access, report, discrimination), why is there something it is like to be conscious? Why qualia?
- **Reframing within this framework:** The question conflates levels. "Something it is like" belongs to the experiential axiomatic self by definition it is part of the first-person model's content. Asking why there is first-person experience is like asking why there are interference patterns in the wave model of light. The answer is: because that is what the model represents.
- **The legitimate empirical question is:** under what physical conditions is the experiential axiomatic self instantiated? This is a question about neural organization, integration, and representational structure difficult but not metaphysically mysterious.

13.4 Anthropocentrism

- **Traditional assumption:** Humans are special, ontologically distinct from other physical systems, because of consciousness or selfhood.
- **Correction within this framework:** Humans are empirical selves composed of physical constituents, exactly like electrons, trees, planets, and galaxies. The difference is organizational: humans instantiate experiential axiomatic selves due to specific neural structure. This is a structural distinction, not an ontological divide. Humans are not metaphysically privileged. [Pawar, 2026a,Pawar, 2026b,Pawar, 2026c,Dennett, 1991,Metzinger, 2003]

14 Brain Damage and the Empirical-Axiomatic Distinction: A Worked Example

To illustrate how the framework operates in practice, consider the case of a person who suffers a stroke that damages language-processing regions of the brain.

14.1 Empirical Self

The empirical self the human organism continues to exist throughout. Neural tissue is damaged, specific causal pathways are disrupted, but the organism persists as a continuous physical system. Organizational patterns are altered but not eliminated. The person does not cease to exist.

14.2 Biological Axiomatic Self

The biological model remains valid and tracks the changes: damaged tissue, altered metabolism, inflammatory response, compensatory neural reorganization, potential recovery pathways. This model successfully explains healing processes and predicts outcomes.

14.3 Neurological Axiomatic Self

The neurological model identifies the lesion location, affected circuits (Broca's area, Wernicke's area), disrupted connectivity, and compensatory activation in other regions. This model explains why specific linguistic functions are impaired while others remain intact.

14.4 Experiential Axiomatic Self

The experiential model is partially degraded. The person's first-person experience of language is disrupted: they may struggle to speak, understand, or formulate sentences, while the sense of "I" typically persists. Self-representation continues, but its content and structure are altered.

Why is the experiential model affected?

Because its neural instantiation has been disrupted. The physical organization that realizes the experiential axiomatic self has changed. This is not mysterious it is exactly what we expect when models are instantiated in physical structure.

14.5 Light Parallel

Compare this to light passing through a damaged optical system (scratched lens, misaligned mirror):

1. **Empirical self (light):** Continues to exist unchanged. Light itself is not damaged.

2. **Ray model:** May fail entirely (scattering from scratches violates ray assumptions)

3. **Wave model:** Still valid but predicts different interference patterns

4. **QFT model:** Still valid; unaffected at this level of description

Different models are affected differently because they have different domains of validity and different dependencies on physical conditions. The same is true for axiomatic selves of the human organism.

The experiential model is vulnerable to neural damage not because it is "less real" but because it depends on specific physical organization that can be disrupted. [Pawar, 2026a,Pawar, 2026b, Pawar, 2026c, Dennett, 1991, Metzinger, 2003, Damasio, 2010]

15 The Universe as Empirical Self

A final clarification concerns the status of the universe itself within this framework. Can the universe be treated as an empirical self?

15.1 Extension of System Boundaries

When selecting a system for study, we draw boundaries that define what is included. For a gas, we might include molecules within a container. For an organism, we include cells and tissues within a spatial boundary. For a solar system, we include gravitationally bound objects within a region of space.

We can extend these boundaries systematically: from a single cell to an organ, from an organ to an organism, from an organism to an ecosystem, from an ecosystem to the biosphere, from the Earth to the solar system, from the solar system to the galaxy, from the galaxy to the observable universe.

At each step, we are expanding the system by including additional physical constituents and enlarging the spatial boundary. At the ultimate extension, we reach the boundary of the universe itself.Beyond this boundary, there is nothing further to include. The universe is the maximal physical system.

15.2 The Universe as Empirical Self

The universe can therefore be treated as an empirical self: it is a physically instantiated system composed of all physical constituents that exist. It evolves in time (expands, cools, forms structure). It is not a model, not an abstraction, but the totality of physical reality itself.

Treating the universe as an empirical self does not attribute consciousness, agency, purpose, or meaning to it. It is not a theological claim. It is simply the recognition that the universe is a physical system like any other, distinguished only by being maximal it contains all other systems as subsystems.

15.3 Axiomatic Selves of the Universe

Just as with any empirical self, we construct axiomatic models of the universe:

1. **Cosmological models:** Describe expansion, matter-energy content, geometry, and evolution (CDM model, inflationary cosmology)

2. **Thermodynamic models:** Describe entropy, arrow of time, heat death scenarios

3. **Quantum cosmology:** Attempts to model early universe and quantum gravitational effects

These are axiomatic selves of the universe representations constructed to explain its large-scale behavior. None of them is identical to the universe itself.

15.4 Well-Definedness of the Universe

Is the universe well-defined as a system? Yes, relative to cosmological models that successfully describe its expansion, structure formation, and evolution. These models make predictions (cosmic microwave background, large-scale structure, nucleosynthesis) that are empirically confirmed.

Unlike arbitrary collections ("all red things in the universe"), the universe forms a causally and spatially integrated whole. It is bounded not externally but by the fact that nothing lies outside it. This makes it a special case but does not exclude it from being treated as an empirical self.

15.5 Comparison With Other Empirical Selves

In what sense is the universe similar to, and different from, other empirical selves?

Similarities:

1. Composed of physical constituents
2. Evolves in time
3. Can be modeled with axiomatic selves
4. Is not identical to any model
5. Is well-defined relative to successful models

Differences:

1. Maximal: contains all other systems
2. No external environment (closed system)
3. No boundary in the usual sense (nothing outside)
4. Unique: there is only one universe

These differences do not disqualify it from being an empirical self. They make it a special case, but the same conceptual framework applies. Just as the photon is the simplest case of an empirical self at the quantum level, and the human organism is a complex case at the biological level, the universe is the maximal case. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c, Giere, 1988]

16 Summary and Conclusion

This paper has clarified the concept of self by grounding it firmly in physical reality and by explicitly separating empirical existence from axiomatic representation. Rather than introducing a new metaphysical theory, the aim has been conceptual clarification: to place the notion of self within the same disciplined framework that successfully governs scientific practice. The central insights of the paper may be summarized as follows.

16.1 Core Distinctions

- **Empirical self.**

  An empirical self is a physically instantiated system composed of physical constituents and embedded in the causal structure of the universe. It exists independently of any description or model. This notion applies uniformly across scales, including electrons, atoms, trees, human organisms, galaxies, and the universe as a whole.

- **Axiomatic self.**

  An axiomatic self is a model-level representation constructed in abstract space to describe, explain, or predict the behavior of an empirical self. Axiomatic selves do not exist physically; they are representations defined by assumptions, formalisms, and domains of validity. Multiple axiomatic selves can coexist for the same empirical self.

- **Experiential self.**

  The experiential self is a specific axiomatic self whose content includes first-person perspective, phenomenal consciousness, and the sense of "I." In humans, this model is physically instantiated in neural structure. It is one representation among others of the same empirical organism.

- **Systems as selected objects of study.**

  Systems are not intrinsically or uniquely defined by nature. Rather, they are selected as objects of study based on explanatory interest and the success of modeling. A system becomes well-defined only relative to stable and successful axiomatic representations.

- **Identity without fixed constituents.** The identity of a system is grounded in organizational continuity and causal coherence, not in the persistence of specific material constituents. This applies equally to open systems such as organisms and to physical systems described by modern physics, where constituent-level identity is not fundamental.

16.2 The Light Parallel

Throughout the paper, the framework has been illustrated through systematic comparison with the case of light. This comparison is not metaphorical but structural: it reflects the fact that the same empirical–axiomatic distinction applies across all physical systems.

Aspect	**Light**	**Human Self**
Empirical self	Light as it exists physically	Human organism as it exists physically
Axiomatic self 1	Ray optics (geometrical paths)	Biological model (metabolism, cells)
Axiomatic self 2	Wave optics (interference, diffraction)	Neurological model (neural circuits)
Axiomatic self 3	Particle model (photons, quanta)	Cognitive model (information processing)
Axiomatic self 4	Classical electromagnetism	Experiential model (first-person "I")
Axiomatic self 5	Quantum field theory	Social model (roles, relationships)
Multiplicity	Many models, one reality	Many models, one organism
Instantiation	Models track physical behavior	Models track organismal behavior
Ontological status	Wave and particle are not entities	Brain and mind are not substances
Domain of validity	Each model applies in specific regimes	Each model explains specific aspects
Well-definedness	Defined by modeling success	Defined by modeling success

The light case demonstrates that apparent incompatibilities between models do not imply ontological conflict. In the same way, biological, neurological, cognitive, and experiential descriptions of the self coexist as non-identical but valid representations of a single empirical system.

16.3 Philosophical Implications

When grounded in physical reality and disciplined by the empirical–axiomatic distinction, several long-standing philosophical problems are dissolved rather than solved:

- **Mind-body problem.**

  There is no need to posit separate substances. There is one empirical self and multiple axiomatic models describing it at different levels.

- **Personal identity.**

  Identity over time is grounded in organizational continuity and causal structure, not in the persistence of specific particles or constituents.

- **Hard problem of consciousness.**

  The problem is reframed as a question about the physical and organizational conditions under which experiential axiomatic models are instantiated, rather than as a demand for a new ontological category.

- **Anthropocentrism.**

  Humans are not ontologically exceptional. They are continuous with all other physical systems, differing not in kind but in organizational complexity and modeling richness.

16.4 Final Statement

The self is neither a metaphysical primitive nor an illusion. It is a physically instantiated system that admits multiple axiomatic representations. Experiential selfhood the "I" each person knows directly is one such representation, instantiated in neural structure. It is real, but it is not ontologically fundamental.

By maintaining a disciplined separation between physical existence and abstract representation, and by applying the same conceptual framework that has proven successful in physics, long-standing confusions about the self are not resolved by new speculative theories but dissolved through correct conceptual placement. The self, like light, is clarified not by discovering what it "really is" in some ultimate sense, but by understanding how empirical reality relates to the multiple models constructed to represent it. [Pawar, 2026a, Pawar, 2026b, Pawar, 2026c, Popper, 1959, Quine, 1951]

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