Title
Spacetime Philosophy

Abstract

In this paper, I introduce a novel conceptual framework, called Spacetime Philosophy (SP), which adopts the structural features of four-dimensional spacetime to resolve important philosophical questions. By offering a unified approach that aligns longstanding philosophical issues with the physical reality of the universe, SP explains persistence, identity, and change without invoking perception, consciousness or metaphysical assumptions; clarifies time, causation, laws, induction and modality; situates human agency and free will within an integrated, causally coherent structure. and dissolves puzzles arising from idealism, sense data and ideas of momentary selves.

Introduction

Although the theory of spacetime has existed since the early 1900s, philosophers have yet to integrate its properties into a single, systematic scheme that exploits its full philosophical potential. This paper proposes a framework, which I call Spacetime Philosophy (SP), that makes spacetime's unified continuum of four dimensions, as described by modern physics, the foundation for addressing many long-standing problems, including time, identity, causation, laws, induction, modality and human agency.

Although any theory might be revised, spacetime is the best tested cohesive account of the universe known. As set forth in my paper *Spacetime as a Universal Basis for Induction and PUN,* spacetime theory underlies GPS systems, spaceflight and countless other modern activities. Until improved or replaced by a better theory, spacetime provides a firmer foundation for philosophical work than any alternative currently available.

In that paper, I was careful to avoid treating physics as settling metaphysical truth. Instead, I relied only on the structural features of spacetime that resolve philosophical problems without additional assumptions. This methodological constraint guides SP throughout: it excludes accounts that conflict with spacetime itself or that introduce elements, such as a single global present, that play no explanatory role. The same methodological stance guided me when I considered divine imaginative capacity in my paper, *The Paradox of Infinite Imagination in Anselm's Ontological Argument,* where I showed that adding an unfounded metaphysical assumption generates an internal contradiction rather than resolving the problem that it was meant to address.

Using spacetime's well-established theory provides a principled framework for specific issues without altering physics or proposing new metaphysical theories. In the following pages, I will show how application of SP dissolves problems based on misconceptions about the temporal and structural nature of reality, including historical debates over perception, knowledge and idealism. I have considered several of these issues in earlier papers. For the sake of comprehensive review of these important issues, I will mention those papers as pertinent but only briefly and only to direct readers to fuller arguments on those subjects. This paper does not revise my earlier arguments but brings them together under a single spacetime-based framework.

Readers familiar with debates over theories dealing with persistence through time, such as endurance and perdurance, will recognize points in common with SP. SP, however, does not adopt or presuppose any particular version of these or related views. It stands on its own structural footing. Similarly, it does not apply to all related subjects, such as moral responsibility and quantum theory, that cannot be resolved simply by reference to spacetime.

1. The Basic Physics of SP

Spacetime has certain fixed, integral features, of which just six will cover the issues ahead. I sketch them out here for reference as needed later.

1. Spacetime is a single four-dimensional structure. All events, past, present and future as we live through time on the human scale, exist together as elements of one continuous four-dimensional reality in which all events are located. *Spacetime as a Universal Basis for Induction and PUN* explains this structural element in greater detail.

2. Time is a coordinate dimension like space. It does not flow; change happens within it. I covered this structural element as well in my induction and PUN paper.

3. There is no single universal "now"; what counts as past, present or future depends on the observer and its frame of reference.

4. Relations among events in space and time are fixed. Events have a definite place in space and time, and the distances and order among them don't change just because someone is looking at them. For example, if one event happens three seconds before another in one location, that interval is fixed in the spacetime structure, or if two events occur five feet apart, that distance is the same in the structure itself.

5. Given the actual distribution of matter and energy in our universe, most events stand in causal relations. Objects and processes usually interact regularly. Only in rare extreme cases, such as travel near the speed of light and intense gravitational fields typical only of black holes and neutron stars, can events be isolated. Otherwise, causal connection is the normal situation.

6. Spacetime is the same for everyone. Distances, the order of events and causal relations stay the same, even if observers describe them differently.

These principles, which identify features of spacetime itself rather than our perceptions, form the basis for the sections that follow. Some principles describe geometry, others describe how matter exists within it. SP's philosophical contributions come from geometry, while physics tells us what fills that geometry.

I will show in the following sections how these features help us understand time, persistence, perception, induction, causation, laws, modality and agency. Although the philosophical problems vary in nature, the underlying explanatory basis remains the same for all.

2. SP Explains the Apparent "Flow" and "Direction" of Time.

SP distinguishes three aspects of time: temporal order, temporal direction and temporal passage. Temporal order is the sequence of events. Direction comes from physical asymmetries, such as entropy. Passage is how change in spacetime seems to us, not a property of spacetime. These distinctions allow SP to recognize that how we perceive time is real to us even though time at the structural level has no "past," "present" or "future."

Philosophers have long debated whether time passes, flows or moves from past to future. SP shows that this debate arises from a mistaken characterization of time itself. As set forth in Section 1, time is a dimension of a single four-dimensional structure, not a process that carries events along. Nothing moves through time; change occurs within it. "Now" marks our place in spacetime; "passage" reflects our perception of the order of events.

One might well wonder, then, how time seems to pass when it has no flow or movement from past to future. On the human scale, time seems to move, and only in one direction. When a clock ticks, the current second has moved into the past and a new second has begun. It never happens that the tick of the clock moves us back one second. On the spacetime scale, however, time has no built-in

direction. Spacetime is "temporally symmetric": flipping the time direction doesn't change the structure. Earlier and later are real relations, but there is no "forward" or "backward" built into spacetime.

The apparent direction or "arrow" of time for us comes from physical processes, not from time itself. Our experience of time remains real at the human scale but the sense of passage arises only from asymmetric physical and cognitive processes within spacetime. Many physical processes are asymmetric: they behave differently depending on which way we look along the temporal dimension. Entropy, how "mixed up" energy is, increases in only one direction, radiation spreads outward from a source and information flows from past to future. If we imagine these processes running in reverse, they no longer look physically possible. These asymmetries arise from the distribution of matter and energy and from thermodynamic boundary conditions, not from the structure of time.

SP therefore separates the geometry of time from the behavior of physical systems within it. Spacetime is like a road without directional arrows. Traffic on it can go one-way but the road itself has no direction. The asymmetry comes from the traffic, not from the road. For us, the physical processes that make up our time-traffic all move in what we call the forward direction, even though the spacetime road itself has no built-in forward or backward.

3. SP Resolves Puzzles of Consciousness and Identity

A. The Problem of Identity Through Change

Philosophical accounts of identity have long struggled to explain how something can remain the same thing as it changes, even continuously. This difficulty arises most sharply in cases involving humans, whose bodies, mental states and memories change constantly, but it also appears in familiar puzzles concerning ordinary objects, such as the famous example of the Ship of Theseus, which I discuss below. Traditional approaches often attempt to base identity on memory, psychological continuity, material composition or some presumed underlying metaphysical feature. Each of these strategies encounters paradoxes when change becomes extensive, memory fails or material replacement is complete.

In line with the basics of spacetime set forth in Section 1, SP recasts the problem. Identity does not depend on what exists or is remembered at a single moment. In SP, identity is a single, continuous structure in spacetime. Change is not an aberration or a difficulty that a theory of identity must accommodate; it is an internal, expected feature of this structure.

B. Identity as Spacetime Extension

Pursuant to the first two principles of spacetime presented in the previous section, entities in spacetime are not objects confined to a single moment, as if they could have a different identity at each passing instant. They are extended regions of a four-dimensional structure. No extra rules are needed for persistence through time; it is built into the structure itself.

This account avoids the error of dividing identity into an infinite number of instantaneous selves. A person is not a succession of selves but a single, extended entity whose changes occur within that structure. Changes occur continuously, down to cellular, biochemical and neural levels. For example, people shed skin cells, lose hair and sometimes undergo amputation of a limb. Even so, identity persists no matter the form and degree of such changes. Identity rests on the full structure; small changes don't create a new entity. The entity persists with all its history so long as it occupies an integrated, causally unified spacetime region.

What does it mean to say that I no longer occupy a spacetime region when I die? Does my region disappear?

An entity, whether a person or something else, exists as the whole spacetime region that it occupies. What we call "death" is simply the boundary of that region, not a metaphysical transition or the disappearance of a persisting entity. Nothing "ceases to exist" in any further sense. The entity's spacetime region includes all events that constitute its life, and no further events lie beyond its temporal boundary. Questions regarding persistence after death therefore arise only if we assume that identity depends on a present-moment self. Once identity is understood in structural terms, survival is not an additional metaphysical fact beyond the existence of the spacetime region itself. SP thus removes the metaphysical puzzles surrounding death by showing that they rest on a mistaken picture of what it is for an entity to endure through time even though changes such as death are real to us at the human level.

C. Consciousness and Psychological Continuity

Many theories treat consciousness, memory and psychological continuity as essential to personal identity. They often use classical examples, such as the old soldier who remembers his middle age but not his youth, to show that memory cannot provide a rule for identity over time. SP dissolves these puzzles by denying that memory constitutes identity at all.

Consciousness and memory happen within spacetime, but they don't determine identity. SP does not deny the reality or importance of conscious experience; it denies only that consciousness or memory determines whether a person continues to exist. As much as memory contributes to self-understanding, narrative coherence and practical recognition, it does not determine metaphysical persistence. The underlying spacetime structure described in Section 1 explains why a person remains the same even when memory fades, consciousness lapses or psychological traits change as happens with age and dementia.

This distinction also clarifies Hume's analysis of identity. Hume, among others, denied the existence of a persisting inner self subject to discovery by introspection. No such inner substance is required for SP, but it does not follow that identity is illusory. SP takes no position on Hume's contention. Hume's critique targets an internal, phenomenological self while SP offers instead a structural account of identity grounded in spacetime continuity, independent of introspective access.

D. Beginnings, Function and the Ship of Theseus

The age-old conundrum of the Ship of Theseus illustrates how identity can persist despite complete material replacement. This paradox asks whether an object remains the same when all its parts have been replaced. Under SP, the ship is identical not with any particular set of planks but with the continuous spacetime structure formed by their systematic replacement across time.

A further question concerns beginnings. When does Theseus' ship exist? It exists not with the first plank alone but when the parts function together as a unified structure. Full construction isn't necessary for the ship to exist. An unfinished vessel might already function as a ship in limited ways, as a prototype or training model, for example, and at that stage already constitutes the ship's spacetime beginning.

Identity here does not depend on arbitrary external labeling. It depends only on the emergence of an integrated structure, the parts of which function together in a stable way. Function matters not as an imposed definition but as evidence of structural unity within spacetime.

E. Mixing Parts and Successor Identity

Identity theories also have wrestled with a variation on the Theseus problem. Suppose the ship continues with replacement of all its parts while its original planks are assembled into another ship. The theories ask, is either of these two ships the Ship of Theseus?

SP yields a clear result. The continuing ship remains identical to the original; the reassembled vessel is a new entity with a distinct spacetime history. If parts from the ships are mixed, neither resulting ship is strictly identical to the original. Identity does not split; it continues where the ship keeps the same spacetime region. In this situation, the first ship loses spacetime continuity and the second occupies a new spacetime region. Thus, although each might be a partial successor, neither is the Ship of Theseus.

The same SP basics apply in familiar science-fiction cases involving people, where one person's body and mind are divided and used to form two later persons, each of whom stands in equal relation to the original person. In such cases, there is no principled way to say that one resulting person is the original and the other is not. Identity doesn't split; at a division, two separate entities emerge. Each successor continues aspects of the original person but neither is strictly identical to the original.

F. Extreme Cases and Relativistic Constraints

As recognized in the fifth basic feature of spacetime, its structure can impose limits on causal connection. Under extreme relativistic conditions, regions can be causally isolated. Such cases are exceptional and do not arise in ordinary activities or regarding objects on the human scale. Within the overlapping causal regions that characterize normal experience, identity remains well-defined and stable.

G. The Scope of the Account

SP's account of consciousness and identity focuses only on metaphysical identity, that is, what it means for an entity to remain the same across time. It does not resolve questions of moral responsibility, legal personhood or personal narratives, although these topics could draw on SP as a stable foundation. The theory also does not rely on far-fetched hypothetical scenarios disconnected from reality. It concerns identity as it exists within the actual spacetime structure of the world that we inhabit. Finally, that later stages of a person's spacetime region exist does not mean that they are fixed independently of the person's deliberation; those later stages include the deliberative processes themselves and causally depend on those processes.

H. Conclusion

SP resolves traditional problems of identity by rejecting the assumption that persistence must be explained in terms of momentary states, memories or features. Identity is neither mysterious nor fragile; it consists of a continuous, integrated structure extended across spacetime. Change is internal to identity, not a threat to it. In this way, SP provides a clear, unified account of both personal and object identity, grounded in the same principles that govern existence itself.

4. SP Eliminates Ideas, Idealism and Sense Data as Bridges Between Objects and Mind

Beginning with John Locke, modern philosophers have sought to explain how we can gain knowledge of external objects. Locke believed that all knowledge derives either from sensation or

reflection and therefore concluded that the mind perceives only ideas caused by objects, not the objects themselves. The concept of ideas thus served as a bridge between mind and an external world presumed to be beyond our direct knowledge.

Under SP, mind and world exist within a single causal structure; they therefore are not separate entities, do not require a bridge and, except under certain rare relativistic conditions not present in ordinary human experience, stand in direct relations without need of any intermediaries such as ideas. Even if they have mental content, perceptions are causal relations between spacetime events, not barriers between mind and world. Moreover, by removing the need for ideas as essential intermediaries in the pursuit of knowledge, SP eliminates the traditional problems of explaining how we can know whether mental representations resemble the objects that they purport to represent.

The same reasoning applies to Berkeley's and Russell's later developments of Locke's conception of ideas. Where Locke argued that ideas serve as a bridge between things and the mind, George Berkeley denied that material objects exist independently of perception, arguing that only ideas and perceiving minds exist. Bertrand Russell rejected Berkeley's idealism and introduced his theory of sense data in an attempt to preserve objectivity while maintaining that the mind does not directly apprehend external objects. Despite their differences, each of them accepted Locke's premise that the mind cannot directly grasp objects and therefore requires a link, whether ideas or sense data, for acquiring knowledge. Once that premise is rejected within a spacetime framework, SP shows that Locke's ideas, Berkeley's idealism and Russell's theory of sense data all arise from a mistaken view that mind and world are separate rather than integrated aspects of a single structure.

5. SP Eliminates Perception of Objects as Necessary for Their Existence

Given his belief that material objects have no independent existence apart from ideas and minds that perceive them, Berkeley famously stated that "*esse est percipi*," or "to be is to be perceived." According to this view, ordinary objects continue to exist only when they are perceived. To prevent unperceived objects from blinking in and out of reality, Berkeley invoked God as a universal, continuous observer. Because God always perceives all objects, they exist at all times by His grace.

Berkeley's theory not only makes observation a fundamental condition of existence but injects a particular theology by requiring a divine, omnipresent observer. SP's unified spacetime renders both of those requirements unnecessary. Whereas perception reveals only a temporal slice of reality, spacetime itself ensures the existence of objects at their locations. Objects persist not because they are perceived but because they occupy spacetime regions. We therefore can replace Berkeley's maxim with *quod est in structura, est:* whatever is in spacetime, is. An eternal observer such as God is unnecessary for this purpose since spacetime itself guarantees persistence within the region.

We can see how neatly and succinctly this approach answers the age-old question: If a tree falls in the forest and no one is there to hear it, does it make a sound? The question presumes that sounds can exist only if heard, that is, perceived. SP removes that assumption. The resulting vibrations in the air, sound waves that we can perceive, are part of spacetime and therefore exist independently of any observer.

Spacetime's structure, nonetheless, does not imply that existing objects exist eternally. Objects exist only for the duration of their spacetime extent; when that extent ends, the object does not exist beyond that boundary. Matters, of course, look different to us at the human level. Change, including death, is real to us, regardless of its status in spacetime, in which earlier stages of an entity remain fixed.

As in the last section, SP provides a direct route to knowledge without recourse to ideas or other intermediaries, and shows that objects exist continuously, independently of perception. Just as the

6

principles applied in Section 2 explained how personal identity exists across time despite changes in a person or object, they explain how all objects continuously exist in spacetime's unified structure.

6. SP Provides a Basis for Induction and PUN

Since Hume's critique of induction and PUN, philosophers have sought to found inductive reasoning on features of the world rather than on an additional assumption. In my paper *Spacetime as a Universal Basis for Induction and PUN,* I argue that the continuous structure of spacetime across time provides that basis. Induction rests not on a separate principle but on the spacetime features outlined in Section 1. Induction requires no proof; under SP, spacetime structure makes it reliable. Because events that we describe as past and future exist in the same spacetime, observed patterns give reliable support for predicting what happens next.

With a universal, structural basis for induction in place, SP also encompasses my paper *Knowledge Without True Belief.* There, I defined a "fact" as the best-supported conclusion available given all relevant evidence and reliable methods, and so sufficiently supported that rational inquiry compels assent, even though it remains probabilistic and subject to revision rather than necessarily certain. I then argued that the probabilistic results provided by proper application of induction offer a reliable basis for knowledge. SP therefore not only offers a firm basis for induction but counts its most rigorously examined inferences as genuine knowledge.

7. SP Supports Ordinary Causation

Although causation cannot be proved as a necessary connection, SP treats it as the best-supported working proposition: it organizes evidence, supports reliable prediction and fits the spacetime structure described in Section 1. Spacetime's incorporation of causation, however, in no way suggests a deterministic universe. Determinism is a substantive modal claim about what must occur given the past, not something entailed by causation itself. SP therefore relies only on normal causation: later events follow earlier ones, but outcomes are not fixed. As I argued in *A Modal Proof Against Hard Determinism* and *Determinism (Almost Certainly) is Wrong – and That's a Fact*, causal relations can constrain outcomes without rendering alternatives impossible. Causation thus is reliable and intelligible, yet open-ended, precisely the conditions required for rational deliberation and free action, as I discuss in Section 9.

SP also explains why causes precede effects; later states follow earlier ones in a stable, predictable way. In Section 2, I explained that, although spacetime itself is temporally symmetric, causal relations are embedded in physical processes, such as entropy gradients and information flow, that exhibit asymmetry. Because of that asymmetry, information flows from earlier states to later ones. An effect therefore contains information about its cause, but a cause contains no information about its future effects. Since influence runs only from earlier to later states in our frame of reference, causes always must come before effects in all cases that actually occur, just as needed for human predictions and inferences based on induction as set forth in Section 6.

8. SP Underlies Laws and Modality

SP clarifies the status of laws and modal claims as well. I assume the standard modal principle that any scenario that is coherent and free of contradictions counts as evidence of metaphysical possibility unless there exists a clear, demonstrable reason showing that it cannot occur. This approach

mirrors the modal analysis in my critique of Anselm's argument, where I showed that a concept's internal structure can itself generate contradictions that undermine its modal claims.

Laws of nature are not external necessities imposed on spacetime. They also are not, as many have supposed or felt obliged to believe, mere regularities derived from events and observed patterns. They are not unexplained governing facts, summaries of regularities, powers or dispositions, or merely predictive tools. They describe stable features, including those listed in Section 1, inherent in spacetime itself.

Possibilities and necessities depend on spacetime structure. What is physically possible corresponds to what can occur within a continuous spacetime region where events can influence one another; what is impossible reflects structural constraints, not metaphysical necessity. Different possibilities correspond to different possible arrangements of spacetime, not to separate worlds.

SP therefore provides a natural basis for modality: facts about necessity and possibility are reflected in spacetime relations, not posited independently of them. This account preserves the operation of universal laws without implying determinism; supports genuine alternative possibilities; and aligns laws and modality with identity, causation and agency under a single framework.

9. SP Supports Free Will and Agency

SP also clarifies human agency and free will. Given the basics of a spacetime framework set forth in Section 1, actions occur within continuous regions where causes influence effects without fixing outcomes. Agents are not moment-to-moment fragments and their decisions are extended across spacetime, not isolated events.

This structure makes deliberation and control intelligible. A person makes decisions within an integrated causal network, allowing one decision to influence another while operating within the stable structure of the world. Free will is neither a mysterious break from causation nor threatened by change or uncertainty. It consists instead of an agent exercising capacities across a unified spacetime region, where different outcomes are possible within the constraints of the causal structure. Because spacetime is fixed, "could have done otherwise" refers to what happens in similar possible versions of the universe. Free will concerns actions across these alternative spacetime scenarios, not altering the one that we inhabit.

These points build directly on the arguments in my papers *A Modal Argument Against Agent-Relevant Indeterminacy, A Path Towards Free Will* and *The Ascent of Free Will.* Those works develop the minimal positive theory of free will: agents shape outcomes through reason without needing special powers. SP now situates those capacities within a concrete spacetime framework, showing how agent action is integrated within the structural reality of the universe.

Conclusion

In sum, SP provides a unifying foundation across all the areas explored in my prior papers cited above. It eliminates problems arising from ideas about flow and direction of time; explains the persistence of identity in persons and objects despite change; grounds induction and the reliability of inductive knowledge; preserves ordinary causal connections without implying determinism; and situates free will and agency within coherent areas of spacetime that can influence each other. It also accounts for the status of laws and modal facts as features of spacetime itself. Across time, identity, knowledge, causation, induction, free will and laws, SP demonstrates the explanatory power and reach of its single, integrated structure for some of philosophy's central problems.