Definitions for Consciousness and Awareness that Address Panpsychism's Combination Problem[1]

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[ABOUT THIS ARTICLE] As long as you are comfortable with metaphysical puzzles and have some background in the philosophies underlying world religions, you might like this article. When I submitted it for publication, the reviewers had particular difficulty understanding my abbreviated explanation of the paradox at the heart of my definitions. For them, I clearly tried to accomplish too much for an article of this length. To read more about the paradox at the heart of this article as well as my approach to panpsychism, see *Reality's Fugue: Reconciling Worldviews in Philosophy, Religion, and Science* (Penn State University Press, 2017).

Abstract: *This article develops new working definitions for consciousness and awareness that are consistent with panpsychism and overcome its combination problem. The principal focus is on the nature of awareness, with consciousness defined as a particular kind of awareness. The definition of awareness is based on the distinction between first-person and third-person views and on how both views play essential roles in any occasion of awareness. The analysis offers fresh perspectives on what it means to have subjective experience as well as on a number of longstanding philosophical problems, such as the problem of perception, the problem of other minds, and the free will versus determinism debate.*

1. Introduction

This article proposes a new formal working definition for a primitive version of consciousness that I believe has the potential to solve panpsychism's combination problem. That is to say, it explains how expressions of this primitive consciousness at a very small scale appropriate to quantum mechanics might combine to create consciousness as we know it at larger scales, such as in humans.[2]

Besides overcoming the combination problem, I believe the definition proposed here has the potential to solve another of panpsychism's problems, one that physicist Sean Carroll brought up in a video discussion with Phillip Goff and Keith Frankish (Carroll, 2021). This "relevance problem," as I'll call it, is the issue of what panpsychic properties might contribute to our understanding of matter. Our current understanding of quantum phenomena seems to predict very adequately the behavior of matter at the microlevel. Where, then, would panpsychic properties fit into our accounts of physical reality? Why wouldn't such properties be superfluous?[3]

The definition for this primitive version of consciousness addresses the combination problem by highlighting how any kind of consciousness or awareness is *inherently* a combining process that gathers individuals into larger-scale collections that can, under certain

[1] Parts of this article appeared originally in Brainard (2017).
[2] For more on the combination problem, see, e.g., Chalmers (2014); Goff, Seager, & Allen-Hermanson (2022); or Goff (2019, pp. 144-169).
[3] Seth (2021) makes roughly the same argument against panpsychism.

circumstances, become individuals with this same combining capability.[4] Furthermore, as I’ll discuss later, this combining process would seem to be evident in matter's fundamental microlevel behavior — not as something matter has as an accidental property, but rather as what matter *is* at the microlevel. As such, if the definition has merit, it should also address the relevance problem by giving us a fresh and revealing interpretation of quantum mechanical behavior.[5]

The term I will use for the primitive consciousness I’m defining is *awareness*. “Awareness” as I define it comes in *kinds,* of which our own human waking awareness is the kind we call “consciousness.”

I characterize the two words in this way principally to keep my formal use of them as close as possible to their use in everyday speech. In everyday conversation, awareness and consciousness are used almost interchangeably but with awareness being the more general of the two and used in many situations where our human variety of conscious awareness does not seem implied. For example, it is commonplace to speak of single-celled organisms as being *aware* of their surroundings, but whether they are *consciously* aware is another, debatable matter. Furthermore, of the two terms, awareness seems to focus more directly on the relationship between first-person and third-person views and on what it means for an individual to have a direct experience of one’s circumstances. This subject-object relationship is central to my definition.[6]

Defining consciousness as simply our human kind of awareness does not usefully distinguish it from other ways of being aware. However, this characterization should be adequate for my purposes here. My central focus is not on different kinds of awareness but rather on that which finds expression in these different kinds.

My definition of awareness is a working definition and is not intended to be complete. It characterizes awareness principally in terms of what it does rather than what it is, and it doesn’t necessarily capture all that awareness does — just those features relevant to the two problems of panpsychism mentioned above.

2. First-Person and Third-Person Views

Before giving the definition of awareness in Section 5, I need to clarify the two particular activities of awareness that are central to my definition. I realize that long preliminaries can be a bother, but I see no way around one in this case. Before I give my definition, I need to explain its basis.

In my definition, awareness plays two roles that are in tension with each other. These roles are closely related to the commonly-made distinction in consciousness studies between the *first-person view* and the *third-person view*.

When talking about consciousness, the distinction between the two views refers to two ways of observing consciousness — one from the “inside” so to speak, and one from the

[4] This article proposes a variation of what Goff (2016) calls “phenomenal bonding” whereby the subject-summing capability necessary for this bonding is inherent to the nature of consciousness.
[5] Carroll (2019) writes: “In its current textbook formulation, quantum mechanics has failed in this ambition [to provide an understanding of our world]. We don’t know what’s really going on” (p. 25). This article’s version of panpsychism may help redress this situation.
[6] The use of awareness instead of consciousness in addressing the combination problem is discussed by Chalmers (2014, pp. 25-27). See also Brainard (2017, pp. 65-68).

"outside."[7] For my purposes here, however, I need to reframe this distinction such that these two views describe two ways of being aware of anything at all.

The first-person view as I'll use it is our *individual* way of viewing anything; it is our personal perspective or point of view. It is your or my own awareness of whatever we're aware of. Regardless of what a car or tree or sunset may be as independent of our minds, when you look at such a thing, you perceive it in your way and I perceive it in mine.

The third-person view is more complicated and difficult to pin down. Nagel (1986) has called this view variously the "objective view," the "view from nowhere," and the "centerless view." It's the view we do our best to adopt when we're looking at things "objectively" — when we're trying to understand how things *really are*, as opposed to how they appear to be in our personal first-person views. The third-person car or tree or sunset is what exists irrespective of who is looking — indeed, when no one is looking at all. If you and I were examining the same object but disagreeing about its properties, the third-person view would be that awareness perspective that, were we able to achieve it, would resolve our differences by revealing what the properties *in fact* were. In this respect, this view is our epistemological ideal, the way of knowing that reveals the truth of a matter as opposed to simply our opinions or beliefs.

This general characterization of the first-person versus third-person distinction needs to be sharpened for my purposes here. To do this, I will start with empirical science's formulation of it in terms of *observers* and the distinction between *one* observation and *all* observations, where at least some fraction of these observations are made by human observers with conscious awareness. Then I'll look at how this distinction in science might help clarify the two roles of awareness I'd like to highlight.

To begin, consider how physics defines a "law" of nature. To qualify as a law in physics, an explanation of physical phenomena must have four global symmetries. These symmetries define fundamental dimensions over which laws apply *for all observations*. A law is the same (1) over time; it is the same regardless of when an observation is made. $E = mc^2$ applies a billion years ago as well as today. (2) It is the same over space; it is the same throughout the universe regardless of where an observation is made. $E = mc^2$ applies in other galaxies besides our own. (3) It is the same regardless of the relative motion of observers. $E = mc^2$ applies regardless of how fast an object might be moving past us. (4) It is the same regardless of the angle from which an observation is made or how an object is rotated. $E = mc^2$ applies regardless of how we orient our experimental apparatus.[8]

This way physicists define a law of nature applies as well to all the properties of matter that make up these laws: energy, mass, time, distance, velocity, momentum, force, entropy, and so on. If these terms did not also refer to what was the same for all observations over these four dimensions, the concept of global symmetries would be meaningless.

My starting with the way physics characterizes the third-person view in terms of observers may trouble some readers. One of the main reasons many see panpsychism's account of matter as implausible is because the physical qualities of matter of interest to physicists are those that are typically thought to be *independent* of our human mind and

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[7] These two views lie at the heart of Chalmers's "hard problem" of consciousness. In Chalmers's words: "The fundamental issue concerns how to integrate two sorts of data about the mind. We have 'third-person data' about the brain and we have 'first-person data' about subjective experiences. Both are equally real, and both need to be explained. The task of a science of consciousness is to integrate them into a single framework" (Chalmers 2004, 207). The definition of awareness proposed here posits that this hard problem is built into the nature of awareness. It's an expression of two inherent activities awareness performs.

[8] This relationship between observers and the symmetries and laws of physics comes from Greene (2003, pp. 167-170). If these symmetries of physics turn out to be themselves based on a more fundamental symmetry between order and disorder per Rattigan, Noble, & Hatta (2023), then the definition of awareness proposed here should be helpful for understanding what "order" means in this context.

awareness. They are there *irrespective* of anyone observing them. Defining the third-person view in terms of observers may seem to presuppose matter having some sort of human-like awareness.

It may indeed be that these symmetries merely describe our way of understanding some unknown thing-in-itself. However, this article is not about what is unknown to us but rather about how to reconcile what we observe about consciousness with what we observe about matter and living beings. The physical properties we're trying to reconcile with consciousness are in fact those that seem to hold for all observers of which some are human beings. And the consciousness that we're interested in is the consciousness that seems to characterize at least all human observers.

You can also think of the definition of awareness proposed here as a way to understand what physicists mean by "observer" and "observation" in the context of these global symmetries (which, additionally, should provide insight into physics's measurement problem). My aim is to define awareness in a way that is consistent not only with our own conscious awareness but also with how observer and observation are used in physics. In doing so, I do not at all intend these terms to refer only to our own neurologically dependent variety of awareness.[9]

With these comments in mind, I'll frame the first-person view in terms of *one* observer and the third-person view in terms of *all* observers (with "all observers" to be qualified further). You and I in our conscious, first-person awareness are each one observer making single here-and-now observations. The third-person world we perceive around us and interact with is the world that is the case for *all* observers of which some, but by no means all, are human first-person views as we know them in our conscious awareness.

3. Two Roles of Awareness

I've remarked that the definition of awareness I will be proposing plays two roles that relate to the distinction between first-person and third-person views. Let's look now at how the distinction between these views is expressed in our own conscious awareness. We humans are among the observers referred to in this idea of "all observers." How does this distinction express itself in our own awareness?

Consider how you and I live our lives in the relationship between our first-person views (ourselves as one observer) and the third-person world (what is so for all observers). It is in this third-person world where we find our friends, family, work, play — all that we relate to and interact with as other than ourselves in our everyday lives. We function in the world effectively to the extent we understand the world of all observers and how it behaves.

While individually, we certainly don't know the entirety of the third-person view, we could not survive or accomplish anything at all if we didn't have at least some sense of it. To interact effectively with our circumstances, our brains' neurology must generate at least a rough practical version of our local true-for-all world. It doesn't make any difference where you come down in debates over whether or not this third-person reality we're aware of exists independently of our minds. What is important is that part of what is presented in our conscious awareness is a local take on the third-person view. What we're personally aware of is a world that is, as far as possible, what is true for all observers, not just ourselves.

We now come to the two roles of awareness I want to highlight in my definition. Consider how your awareness or any person's awareness always tries to accomplish two things in any occasion of awareness, any observation.

First, as we experience in our first-person views, awareness plays an individual or *disjunctive* role. Awareness is "disjunctive" in that it expresses itself as *one* observer that is

[9] For a discussion of the observer in quantum mechanics, see Rosenblum & Kuttner (2002).

distinct from other observers. I am aware from my point of view; you are aware from yours. Whatever it is we're aware of, I'm aware of it in my here-and-now; you are aware of it in yours.

I want to emphasize that this single observer perspective is fundamental to the process of awareness. It is not something that merely comes with our physical body's spatiotemporal location. It's something that the neurology of our brains *generates* as part of its generation of our here-and-now conscious awareness.[10] It is awareness itself acting as one point of view, a singular subject, even when it is aware of a variety of things at the same time. This role's behavior is often talked about as the "unity" of consciousness.[11] Without this capacity to interact as a single observer, a single point of view, awareness can't function properly, which is evidenced in psychological abnormalities such as dissociative identity disorders where this unity breaks down.[12]

Second, as evident in the way we're presented with at least a facsimile or portion of the third-person world, awareness also plays a collective or *conjunctive* role. It is "conjunctive" in that it attempts to show us what exists not just for ourselves but also for others and, as far as possible, everyone. While the disjunctive role provides the first-person occasion of awareness, the conjunctive role presents a world that is, as best it can manage, there for other observers besides ourselves, that seems to be there even for creatures that are aware in ways very different from our own.

Notice the contrast between the two roles. In any given awareness event, while the disjunctive role establishes awareness's perspective as *singular* and *different* from other occasions of awareness, the conjunctive role establishes awareness's perspective as *plural* and a *synthesis* of as many other views as possible (with the ultimate goal being Nagel's "centerless" view). Even though we experience ourselves as individuals, our ability to understand our world depends on the extent to which we can view the world from as many perspectives as possible.[13]

So awareness as I will define it in the context of this article is an activity. It is the performing of two roles or tasks that are in tension with each other.

While the disjunctive role may be fairly clear (it's simply awareness's expression as a single, here-and-now, first-person view), I need to elaborate further on the conjunctive role of awareness and particularly the idea of awareness coming in *kinds*.

4. Kinds of Awareness

Up to now, I've spoken of the third-person world as what is there for all observers. This is, after all, how we think of it in physics. The physical properties of interest to physicists are properties any observer or group of observers can be wrong about. They appear to exist independently of anyone being aware of them and, in particular, the human mind. They are properties that we presume exist throughout our universe and were there long before any humans were around to observe them.

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[10] In the context of awareness generating its own singular presence, consider my footnote 23. For more on this disjunctive role of awareness, see the index references to "presence" in Brainard (2017, 264).

[11] See, e.g., Brook & Raymont (2021) or Bayne (2009).

[12] A recent approach to dissociative disorders (Fischman, Lester, & DelViscio, 2023, pp. 36-43) is to encourage the various personalities to work together as a team, which also highlights the importance of awareness's singularity, in this case, a singular group. It also highlights how this singularity is something that awareness itself accomplishes.

[13] This distinction between our here-and-now sensory awareness and the way we are aware of what stays the same from one occasion of awareness to another dates from at least Plato's distinction between sense experience (*eisthēsis*) and intelligence (*nous/noēsis*). Consider here also the scholastic distinction between *haecceity* and *quiddity*.

Despite the way physical properties appear to be independent of the human mind, most of the properties of the world that you and I perceive around ourselves and that interest us most are *not* mind-independent like this. This is particularly evident when we’re indoors and look at the human-made objects that surround us. Certainly, such things have physical properties (spatiotemporal location, mass, molecular composition, etc.) that appear, as best we can tell, to be independent of our minds. But this is not at all the case with other properties.

Let me give an example. Instead of the proverbial tree falling in the woods with no one around to hear it, let’s consider a human artifact: an alarm clock that goes off in a room when no one is around to hear it. Then let's consider the same clock when there is a person around.

When no human is in the room, physical properties are entirely sufficient to describe everything that is taking place. The alarm going off and whatever effect it has on the things around it are entirely explained by physics. Nothing else is needed to explain what is happening in the room.

If a person is in the room, however, notice how all this changes. The behavior of matter alone barely begins to tell us what is going on. If you’re in the room and respond to the clock as an “alarm,” then we surely need a lot more than just the rules of physics to explain why all the atoms in your body suddenly move together across the room and poke a piece of shaking matter. Our explanation could still be couched in the language of science (the language of psychology, for example, for at least part of our explanation), but it couldn’t be strictly physical to satisfactorily account for human interests and behaviors.

My point here is that what we think of as an “alarm clock” has both physical properties and properties that are *human-specific*, relational properties overlaid on the physical ones that come into play only for human beings. While physical properties operate regardless of who or what is present, human-specific properties operate only in conjunction with human awareness. They have no effect in the universe except in relation to a way of being aware that can recognize a particular hunk of matter as a “clock.”

This dependence of properties on who or what is involved holds for everything that participates in our causally interactive universe. If no one is in your kitchen, everything there behaves as matter behaves, and that’s all. When you walk into the kitchen, however, your awareness brings with it opportunities for interaction besides those of matter alone. Atoms and molecules become pots and pans, stove, refrigerator, food, and maybe eventually a cooked meal.

Likewise with properties that depend on other categories of aware beings — cats, spiders, beavers, birds, and so on. It’s in the interactive involvement of members of these groups that properties particular to them become expressed. A fallen tree beside a trail in the woods can be not only a place to sit or firewood to people but also a home or meal for animals or insects — or, indeed, any number of things depending on the creatures involved. But again, the only properties actually in play at any given moment depend on who or what is there and what they’re aware of. Other properties are at best latent: potential or possible properties.

Notice, too, that this is the case with any living thing, not just animals. To whatever extent plants, bacteria, and so on are absent, biological properties become latent. The biological cells at the foundation of life as we know it express their own varieties of properties, properties that are not physical in origin and are not there without living cells being there.

All this is to say that the universe that we think of as there for all observers is more accurately a universe with properties that vary from one group of observers to another. While certain properties such as the physical properties of matter (and the properties of mathematics and logic, to which I’ll return later) may exist for all living creatures, other properties come into play only for particular groups of beings. While the chemical properties of my wool sweaters

exist for both moths and myself, how we relate to these physical properties are different. I see what's there as something warm to wear, while moths see something to eat.[14]

Given the way awareness comes in kinds and how the properties of the third-person world vary depending on the group of aware beings under consideration, I want to amend what the conjunctive role of awareness accomplishes. While this role does offer a take on what is so for all observers, it's a take conditioned by our particular way of being aware, our particular way of making an observation. The third-person world that we're individually aware of is the world that is there for our particular collection of observers.

Despite this true-for-all world being conditioned by our own ways of being aware, without that conditioning, we cannot be aware of anything at all. *Awareness only comes in kinds.* The job of the conjunctive role of awareness is to process what is present to it from the standpoint of what is so for more perspectives than just that of its current here-and-now single awareness occasion. And the way it does this is by being aware in the manner of a collection of observers.[15]

Note that having a *kind* of awareness is essential even for a creature living a solitary life. No living thing could distinguish prey from predator or water from rocks or indeed anything at all unless its awareness can put what it perceives into its creaturely categories, categories that apply to more than one occasion of its kind of awareness. Without this ability, all that would be present in awareness would be meaningless sense data. There would be no way to relate that data to other occasions of awareness besides the current one. Indeed, there would be no way to relate to the third-person world at all.

In other words, the conjunctive role of awareness provides membership in a collective way of being aware that allows the individual to recognize an orderliness in its circumstances appropriate to its kind of awareness.

5. A Definition for Awareness

Here is my definition for awareness in the context of panpsychism's combination and relevance problems:[16]

> **Awareness:** The simple activity of expressing individuality (its disjunctive role) united with collectivity (its conjunctive role).

By "expressing individuality," I mean that awareness in its disjunctive role differentiates itself as one observer, one particular here-and-now in causal interaction with other here-and-nows. As we experience in our own conscious awareness, it establishes a first-person arena for the

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[14] For this article, I've considerably simplified awareness's process of generating properties. In particular, I've glossed over the distinction between primary and secondary properties. On the one hand are primary (or intrinsic) properties that characterize the way a particular kind of awareness presents itself in its behavior in the world. Like physical properties, these properties are there for all. On the other hand are secondary (or relational) properties that characterize the world as it is present to a particular kind of awareness and are there only for that variety of awareness. Importantly, note that both primary and secondary properties are species-specific. They originate with a particular kind of awareness process and are absent when that process is absent. For a much more detailed discussion of awareness's process of property generation, see Brainard (2017; pp. 35, 61-65, 78, 94-100, 140-147, 148-149, 235 note 18).

[15] Insofar as what might distinguish human awareness from other kinds of awareness, consider our human interest in what is so for literally *all* ways of being aware and the progress we've made in that direction.

[16] In prior writings, I defined awareness differently, although the definition was still based on the same distinction used here between awareness's disjunctive and conjunctive roles (Brainard, 2017, p. 138).

presenting of third-person properties and for expressing itself as a current, individual player in the universe.

By "expressing collectivity," I mean that awareness in its conjunctive role manifests as a *kind* of awareness, a way of observing from the perspective of multiple observations and thus determining what is public. An individuated here-and-now occasion of awareness always takes place within the context of finding regularities associated with its particular way of being aware — differentiating what is the same from one observation to another for its kind of awareness. The success of this role depends on how well it embraces other points of view — the extent to which it can synthesize them and determine what is the case for all observers.

By "simple activity," I mean that awareness is nondual; it accomplishes both activities as a single activity. It establishes at once a *single* perspective that is itself *many* perspectives.

Here's an illustration of how these two roles work together in our own everyday awareness of what is around us.

Suppose you and I and some friends are having dinner together. In the middle of the table is a salt shaker; it's ceramic so that its contents are hidden. Where in our simple perception of this salt shaker might we notice the two roles of awareness at work?

Insofar as the disjunctive role is concerned, I'd expect that we'd all agree that we were all different people, and we were seeing the salt shaker as individuals. My eyes see the side facing me; your eyes see the side facing you; the eyes of the others see the sides facing them. No one sees the side opposite their vantage point or the bottom or what is inside.

Nevertheless, despite each of us being an individual person and seeing only a certain side, the salt shaker that we mentally take to actually be there has a back side, a bottom, and salt inside. We each perceive it to be something that everyone at the table sees and could pick up and use. What is there for each of us is what is there for everyone sitting at the table as well as anyone else who might wander into the room as well as a scientist who might examine the salt's chemical composition. The neurology of each of our brains takes the raw sense data of the light reaching our eyes and translates it into a salt shaker that is there for everyone.

While I've described the two awareness activities separately, consider how they are a single activity, how they are not separate in an occasion of awareness. A perceptual occasion of awareness is a first-person view's presentation of what is public, what is there for other occasions of awareness. When I look at the salt shaker, I don't experience myself seeing a neurologically created image of the salt shaker that is internal to my mind and there only for myself. I experience myself *directly seeing* the salt shaker that is *there for everyone*.[17]

In sum, both of the disjunctive and conjunctive activities occur as a *single* activity in every occasion of awareness. We couldn't be aware of anything at all without both roles. If any living creature is to survive, it must discriminate order in its surroundings, an order appropriate to its creaturely interests. To do this, it must have the capacity to be aware in its individual here-and-now of what is so from the perspective of more than one individual here-and-now observation.

You might counter that we could easily imagine a robot that could discriminate order in its surroundings, survive, and perhaps even reproduce. How is the awareness I'm proposing any different from a very advanced artificial intelligence?

Again, awareness as I characterize it here accomplishes its two tasks as a *single* activity, not as a process involving multiple tasks such as an AI requires. There is a nonlogical aspect to this activity (which I'll discuss in the last section) that cannot be duplicated by a computer, at least as we know them today. It is *one* activity that is accomplished by being literally *two opposite* activities.

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[17] How the salt shaker could appear at once both independent of my mind, yet also a creation of my mind is the longstanding philosophical problem of perception. I'll return to this problem in the last section.

A question may also arise as to how the *subjective* quality of consciousness might relate to how I've defined awareness. To use Nagel's phrasing, there seems to be something that it is *like* to be an aware being that we don't find in a stone or a car (there seems to be nothing that it is like to be a stone or a car). Where in my definition might we find this quality of being *like* something?

It seems to me that this subjective quality of being *like* something is captured by this idea of awareness *actively* expressing itself as a *kind* of awareness. It is in the activity of a generic awareness instantiating itself in a particular here-and-now that we find this subjective quality. Saying that there is something that it is like to be a human or a bat seems to me to be essentially the same as saying that a human or bat has an *individual* point of view that encompasses (is *being*) a *plurality* of points of view that *includes* its own *individual* point of view as just one out of many.

Up to now, I've been talking about awareness principally in its capacity of observing. But awareness as I mean it encompasses not just observing but also responding to what is observed. The activity of human awareness is expressed not only in what we're aware of but also in our mental and physical behavior — how you and I react to what we're aware of. When we stop conscious awareness (as in sleep or general anesthesia), we stop the ability to consciously talk, think, or raise an arm.

Awareness in the sense that I mean it is thus a process of interaction. In any given here-and-now, awareness fleshes out its observed local public world with a variety of relational properties and multiple options for action. Decisions are made in a creature-specific way and one option is actualized. While the process varies enormously among life forms, the underlying task is the same. Acting in the world as a marriage of individuality and collectivity, an individual instance of awareness selects among the alternative scenarios presented by its particular kind of awareness. Out of the alternative behavioral options, acting on one of them collapses the alternative possibilities such that only one is actualized.[18]

6. Awareness, Mathematics, and Matter

I've argued that all the properties observed in the universe around us except for those of matter have their origin in awareness's innumerable expressions in various life forms. This section looks at how the properties of matter can also be traced to awareness as I've defined it. The next section will address panpsychism's combination and relevance problems.

Before discussing matter, however, we need to look briefly at the nature of mathematics and how its properties might also relate to the nature of awareness.

Consider in this regard the logical consequences of awareness's two activities. Taken together, their behavior is *set-theoretical*. The simultaneous activity of the disjunctive and conjunctive roles establishes an individual view that is simultaneously a set of views. In an occasion of awareness, our mental take on what is so for all is an observation that collects together many observations.

In generating its set of views, the conjunctive role of awareness doesn't have to view the world from the perspective of a lot of separate actual individuals. It does, however, have to view the world in a way that specifies a way of being aware — that defines a certain set of views for whom the world is, for them, shared.[19] In other words, the set of views generated by

[18] See also the distinction between primary and secondary properties mentioned in note 14.

[19] Sets can be determined by either a list (e.g., the set of "x," "y," and "z") or by properties (e.g., the set of all atoms with one proton in its nucleus).

awareness's conjunctive role is not defined by a list of actual occasions of awareness, but rather by its characteristic of being a specific kind of awareness.[20]

This set-theoretical behavior is fundamental to my characterization of awareness. The activity of awareness is *inherently* set-generating. An individual who is aware isn’t just passively instantiating a category of aware beings, a kind of awareness. The individual is *actively generating* the category — actively participating in establishing/maintaining the category or kind of awareness that it is instantiating such that there is something that it is like to be that kind of aware being.

If awareness by nature behaves set-theoretically, then everything of any creature’s public world that can be traced to the two roles of awareness will exhibit set-theoretical behavior. I’ve already described how biological properties — all non-physical properties — can be traced to the differing ways life forms are aware, which implies that all such properties exhibit awareness’s set -theoretical behavior. I’ve not, however, dealt yet with physical properties.

Let’s turn now to physical properties, the properties of matter. It may already be clear where within quantum mechanics I’ve been heading. I have defined awareness in terms of two inseparable activities that are in tension with each other. I’ve defined awareness in these terms not only because, to me, they seem helpful for understanding the nature of awareness, but also because they seem to strongly suggest quantum mechanical behavior. Analogous to awareness’s disjunctive role is matter’s particle nature. Analogous to awareness’s conjunctive role is matter’s wave nature. Analogous to how awareness resolves its competing possibilities for interaction is the collapse of the wave function.

More specifically, notice the extent to which awareness’s conjunctive role suggests Feynman’s path integral, which sums all possible actions for a particular quantum system. Feynman’s path integral precisely predicts the behavior of *any* quantum system, whether it involves quarks, photons, or black holes.[21]

My point is that, given how I’ve defined awareness, matter appears to behave very much like a *kind* of awareness — or more accurately, a variety of different kinds. Just as you and I act based on our best assessment of all possible action scenarios, likewise elementary particles act based on a summing of all their possible action scenarios. Granted, how the two roles of awareness manifest in human beings and matter are vastly different. But the basic disjunctive-conjunctive behavior is the same.

This interpretation of quantum mechanical behavior as originating in awareness’s two roles is also supported by the thoroughly mathematical behavior of quantum-scale phenomena. I’ve already pointed out how awareness behaves set-theoretically. In this regard, consider how all of mathematics can be derived from set theory. While there are a number of competing foundations for mathematics (e.g., “type theory”; “category theory”), all of them, as I understand them, simply give alternate ways to axiomatize naive set theory so as to remove its paradoxical implications.[22] If all of mathematics can be derived from restricted versions of naive set theory, then all of quantum mechanics’s mathematical behavior can be considered set-theoretical and interpreted as expressions of the two activities I’ve ascribed to awareness. And if this interpretation of matter’s mathematical behavior is correct (i.e., that it is an expression of awareness’s two roles), then awareness is the origin of not simply properties specific to living creatures, but all the mathematically described properties of matter as well.

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[20] Notice the flexibility in the way awareness defines a set of views, at least for humans. If we're checking the time on a clock, we'll want to view the world like people who know how to tell time. If we're trying to figure out how to catch a rabbit, then, at least in part, we'll have to do our best to view the world like a rabbit. In doing this, it seems to me that awareness “knows” itself as not just a *set* of views, but a *set of sets* of views.

[21] See, e.g., Wood (2023).

[22] This subject seems nicely reviewed by J.D. (2023).

A question may arise as to how we are to locate awareness in matter. Is, for example, a photon aware? What about an electron, laser beam, black hole, rock, or planet?

To answer a question like this, we would ask first: What is the smallest scale below which an object’s properties can no longer be traced to smaller-scale behavior, even in principle? Since all these examples are physical and all physical properties can, in principle, be traced to quantum mechanical behavior regardless of how big the object is, I’d expect awareness for all these phenomena to be located at this quantum scale (or, more likely, scales, with probably different scales for at least bosons and fermions). Then we would ask: Where at this scale (or scales) do we find individuality-generation merged with collectivity-generation (i.e., the two roles of awareness) such as to produce these physical properties?

Using these criteria, I’d suspect that photons and electrons are loci of awareness (their wave-particle nature seems pretty fundamental), but not rocks or planets. Assuming the behavior of laser beams and black holes can be explained in terms of properties originating at smaller scales, then they, too, would not be aware (although if black holes turned out to have properties unexplainable in terms of smaller-scale properties even in principle, then we might wonder if they were not, indeed, a locus of some different variety of awareness).

7. Panpsychism’s Combination and Relevance Problems

Let’s turn now to the question of how particles of matter combine to form biological cells, and how cells combine to form multicelled organisms of which some have conscious awareness (panpsychism’s combination problem). I’ve pointed out that set-theoretical behavior is fundamental to awareness as I’ve defined it. One basic characteristic of sets is that individual objects can be combined into sets that can, themselves, become individual objects within other sets. Assuming this characteristic of sets applies to awareness, then we have at least a logical framework for understanding how instances of awareness could gather together to become themselves individuals. Given the right evolutionary circumstances, awareness’s set-theoretical nature should give it the ability to incorporate many individual views and express itself as an individuated synthesis of these views.

The question still remains as to the actual mechanisms whereby sets of awareness instances become themselves individuals within larger sets. With regard to human consciousness, how, exactly, do brain cells meld their conjunctive activity so completely that they generate a unified conscious experience, and do so in a way such that their public world can shift from that of the intracranial biological world to that of our own human public world? Likewise with the “aliveness” — what I’d call the “awareness” — of biological cells. In this case, I expect that the melding of conjunctive activities is what we observe in entangled physical particles. So where, then, in cells might we find entangled particles sufficiently integrated into the workings of a cell such that their public world can shift from intra-cell to inter-cell? [23]

Both of these questions seem to me to be ones that research into these areas by physicists and biochemists should be able to answer if they looked specifically for such

[23] Perhaps helpful in this regard is how the locus of an individual’s first-person view is entirely data-driven and not necessarily the same as where that individual’s first-person view is actually generated. My conscious awareness may be generated by neurons, but when I look at the world around me, I’m much more apt to identify myself with my body than with the neural activity in my head. All that would seem necessary for awareness to shift its first-person view’s location is to change the data being used to generate the world and awareness’s perspective in that world. We do this every night in our dreams and during the day in our imagination and through technological enhancements to our perception like telescopes or virtual reality headsets. Out-of-body experiences provide a particularly vivid example. Here, without any technological assistance, people experience themselves as conscious, yet disconnected from their physical bodies and roaming in a world that seems fully real.

mechanisms (or perhaps there already is an answer in the case of the role neurons play in generating consciousness).[24]

Moving to panpsychism's relevance problem, this definition of awareness provides what seems to me to be a fresh interpretation of quantum mechanics that might help us better understand matter's microlevel behavior and perhaps give us a path for solving physics's measurement problem. It seems to me that "taking a measurement" is equivalent to interacting from a standpoint that encompasses more than just that current standpoint: something cannot be measured without a metric to be measured against. Furthermore, this definition of awareness proposes that physical properties (e.g., gravity, spin, charge) originate at either a certain scale (e.g., the Planck scale) or, more likely, a number of scales. Assuming this is the case, I'd expect this interpretation of quantum mechanics would be helpful for reconciling quantum mechanics with general relativity. If gravity arises at a certain scale, then there is a minimum distance beyond which the force of gravity no longer continues to increase, thus eliminating the problem of gravitational singularities where the force of gravity increases to infinity.[25]

More generally, it is my understanding that physicists don't think of quantum mechanics's wave-particle behavior as particles acting as waves or as waves that are quantized. Rather, they view matter's microlevel behavior as something new that cannot be described in classical terms. Both waves and particles are merged in a way that physicists had never considered before. I would argue that matter's marriage of individual and collective behavior is in fact not new. It is present in every occasion of awareness, albeit exhibited in different ways depending on the kind of awareness.

8. Awareness, Logic, and Paradox

I discussed earlier how awareness's behavior is set-theoretical. The simultaneous activity of the disjunctive and conjunctive roles establishes an individual view that is simultaneously a collection of views.

Notice here that an individual's first-person view of what is so for all first-person views *includes itself as one of the views.* The two roles of awareness establish an individual view that is simultaneously a collection of views *with itself being one of that collection.*

This set-theoretical behavior whereby awareness includes its own view as one of many is another way of talking about a commonly recognized feature of consciousness, namely *self-awareness*.[26] What I'm proposing is that self-awareness is not merely a characteristic of our own conscious awareness; it is a central trait of *all* awareness, albeit collapsed into a single activity. Our own human version is simply an especially complex and sophisticated evolutionary extension of this underlying set-theoretical behavior.

Self-awareness may be commonplace in theories of consciousness, but self-containing sets are a problem in the case of set theory. A set of different things cannot include itself as one of its members without generating paradoxes.[27] The set-theoretical behavior I'm proposing for

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[24] This account of consciousness may also help explain in part why we must sleep. Perhaps, just as human beings can't live in a computer generated virtual world all the time without leaving for a while to address the needs of their bodily selves, so, too, neurons can't live in the world of human conscious awareness all the time without leaving for a while to address the needs of their cellular selves.

[25] If properties arise at and different kinds of awareness are located at different scales, then scale is a fundamental dimension of reality similar to those of space and time (Brainard, 2017, 183-186).

[26] In contemporary theories of consciousness, self-awareness plays central roles in, for example, higher-order theories (HOTs) and the attention schema theory (AST), although not necessarily in the same way I use the concept here.

[27] There are some exceptions where sets can include themselves without paradox, but I don't believe they apply in this case. See, e.g., Moss (2018).

awareness is set theory without the axioms, without the restrictions that remove set theory’s contradicting logical consequences. Trying to create a set like this of which one of the members is the parent set is like trying to put absolutely everything you own into a building you own: the one thing you own that you cannot put into the building is the building itself.[28]

If it is indeed the case that awareness involves paradoxical behavior, shouldn’t we find evidence of this in the world we observe around ourselves? Where are these paradoxes? In the universe as we know it, cats don’t have kittens of which one kitten is the mother cat.

There are at least two reasons why these paradoxes of awareness are not observed in the world around us.

First, awareness is not a part of our observed world. While we make distinctions all the time between things that are aware (e.g., people, birds) and things that are not (e.g., rocks, clocks), we never actually observe awareness in others (the “problem of other minds”). In this universe of ours composed of what is “true for all observers,” there is no observable awareness other than one’s own (and, as best I can tell, we don’t so much “observe” our own awareness as just “feel” or “know” it).[29] And because we don’t directly observe awareness in the world around us, we don’t directly observe awareness as paradoxical. What we find instead are the behavioral results of awareness. And acting in the world collapses the various incompatible possibilities such that only one possible scenario is actualized.

Second, we do find logical contradictions where awareness interfaces with our observed world; however, we typically think of them as “problems” or “puzzles” to be solved, not paradoxes.

Consider, for example, the philosophical “problem of perception” — how every perceived object seems to be both outside our heads and public as well as inside our heads and not public.[30] The longstanding philosophical question of how to resolve this issue is typically characterized as a "problem" rather than a “paradox,” but I’d suggest that our long history with this problem should be taken as evidence that it is not logically solvable as it stands. Instead, the problem should be seen as an outcome of awareness's two roles. (Another approach is to start with the problem of perception and see how this problem might trace back to awareness itself and the two contradicting activities that I've labeled "disjunctive" and "conjunctive.”)

The millennia-old free will versus determinism question is another puzzle related to the way awareness interacts with the world that I would argue stems from the paradoxical behavior of awareness. Note how the puzzle ties directly to the two roles of awareness. When we look at a choice from the perspective of our individual first-person views (the disjunctive role of awareness), we self-evidently seem to have free will; you and I ourselves seem to be the source of our choices. When we look at a choice from the perspective of our collective third-person view (the conjunctive role of awareness), we seem just as obviously to have no free will at all; the collective rules of physics, biology, and psychology seem to be the source of the choosing.

To me, this way we view these philosophical puzzles of awareness seems very much like our historical understanding of light before the twentieth century. Before then, the general consensus was that light had to be either corpuscular or wave; it couldn't be both because that would have been contradictory. In this respect, light's behavior *seemed* paradoxical, but no one (as far as I know) ever said it was *actually* paradoxical. It was just a puzzle to be solved. Today, we know that light does have a combined particle-wave nature, but we still don’t call it

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[28] The logical difficulties of sets that contain themselves is well documented and can be easily found in an online search (e.g., Karagila, 2014).

[29] Given that we never seem to observe awareness in others, the fact that we make distinctions all the time between things that are aware (which, in my account here, include all living things) and things that are not is, in itself, very curious. Why should something we don’t observe in interactions play such an important part in our understanding of the world? I would argue that we make these distinctions because we intuitively know that awareness exists as the unseen origin of what we do observe.

[30] See, e.g., Crane & French (2021).

"paradoxical." It just is what it is — something new. It seems to me that this "new" nature, whatever it is, is shared by awareness.

The list of puzzles stemming from the nature of awareness could go on. If my characterization of awareness is accurate, then its mysteries touch everything we're aware of and are behind almost our entire philosophical enterprise — questions related to cosmology and the nature of existence (metaphysics), questions related to knowledge and how we know things (epistemology), and questions related to our values and feelings (axiology).[31]

Let me close by turning to non-set-theoretical logics. I've pointed out how much of logic and all of mathematics can be traced to the nature of awareness as I've defined it. This relationship of awareness to logic is also interesting in another respect. Not all logics can be derived from set theory. "Modal" logics include operators ("modals") that are not derived from set theory but rather qualify logic's set-member relationships in fundamental ways. In a narrow sense, modal logic deals with "necessity" versus "possibility" (as distinguished from "probability," which is mathematically based and thus can be derived from set theory). In a broader sense, modal logic includes "deontic logic," which deals with morality (obligation and permission) as well as logics concerning time and conditional statements (e.g., if x had happened, then y would have happened).[32]

These kinds of logical operators point to how the definition for awareness I've proposed here is incomplete, and suggest where we might look for a more complete understanding. They point, it seems to me, to the impetus driving awareness — that which inspires us to choose and which disposes matter to enact its own kinds of vectored behavior.[33]

And we may find here new operators that point beyond even this.

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[31] Brainard (2017) discusses how many of our longstanding and most stubborn philosophical problems might stem from the basic nature of awareness.

[32] If awareness is, indeed, the origin of all properties in our universe and, furthermore, behaves in a set-theoretical way, then it seems to me quite likely that awareness is the origin of at least all mathematical logic, if not all logics (an origin that suggests the Greek notion of *logos* or the Neoplatonic *nous*). Such an origin would be consistent with the way logic appears to us to be something entirely abstract and known only in our minds, yet also something independent of anyone's mind — something public and true for absolutely all observers.

[33] Nagel (1986) gives a wonderfully fleshed out account of what it means to live as a human being from the perspective of all observers with oneself being one of those observers. As he puts the subject of his book in his opening sentence: "This book is about a single problem: how to combine the perspective of a particular person inside the world with an objective view of that same world, the person and his viewpoint included" (p. 3).

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