

The Observer Effect, Radical Scepticism, and Consciousness

By Ashley Pringle

Intro

There is a claim made by some quantum physicists that the reality of quantum fields, that they collapse under observation, means that our perceptions, and thus our understanding of the world, are inherently flawed. I mainly point to [Donald Hoffman's claim](#) that our senses act as a kind of headset that prevents us from directly perceiving the true nature of reality, but I have encountered this sort of claim from thinkers in the field of quantum mechanics, philosophy and pop-physics. The contention is that the *true* reality, of quantum fields, is nothing like what we see, and thus our perceptions are merely a projection, an illusion, or otherwise not real. That we cannot trust what we experience, and must instead admit that our perceptions and understanding of the world are not just imperfect, but totally wrong, because what we experience is not *really* reality. That there exists some other layer of reality beyond our reach that constitutes a more real representation of the universe than what we as conscious, observing beings can access.

I contend that this is a form of radical scepticism of the sort I wrote about in my master's thesis [Radical Scepticism's Presuppositions](#). Quantum radical scepticism claims to strip us of our knowledge of the world, but fails to do so because it presupposes a particular conception of what it means for something to be an observer that, while intuitively appealing, cannot reasonably be applied to quantum physics. From this point I work through a potential understanding of what it is to observe that may avoid radical scepticism and anthropocentrism, and attempt to build an understanding of consciousness that follows from this notion of observation. The position I land on falls under that category of what [David Chalmers calls panpsychism](#).

The Observer Effect and Radical Epistemic Scepticism

The story of the observer effect is thus: a quantum particle exists in a cloud of probability with no set properties until an observer looks at it, at which point the quantum field that the particle is part of collapses, and the particle's properties are set, at which point we may measure one of those properties, but not more. Thus, the world as we know it doesn't exist until *we observers* look at it, and even then we have an incomplete picture.

I have intentionally given a quick and simplistic description of the observer effect here. It may be frustrating for a quantum physicist to read due to its brief nature. I reference this rapid description of the observer effect because it is the sort of description that seems to show up often when radically

sceptical claims are drawn from a story about how quantum physics operates. I contend this version of the observer effect is the one that radically sceptical quantum physicists and philosophers often tacitly use.* I also contend that this description of the observer effect is the starting point from which some of the fantastic conclusions about our epistemic standing in a quantum world spring from.

The observer effect is of great significance to philosophy, and particularly epistemology, due to the rather absurd conclusion that can follow from it: in principle we cannot directly observe the reality of quantum particles, not just due to the minute scale of the quantum physics, but due to the fact that observation of any quantum particle affects the state of that particle. Further, even in measuring the properties of a particle, we cannot get a full picture of its state, because some of its state has been changed by us in the very process of measuring it. Thus, the claim may go, there is another, *deeper*, reality in the quantum world that is unknowable to us. This foundational reality is what our world is built on, and thus our perceptions of the world are inherently flawed, relegated to a useful but fundamentally false interpretation of reality.

I find this radical-scepticism-prone understanding of the observer effect unsatisfying. I believe it presupposes an untenable conception of what it means to be an observer. But in order to establish this we must figure out: according to this radically sceptical understanding of the observer effect, what exactly *is* an observer, and how does it take part in the observer effect?

What is an Observer?

It is difficult to decipher what someone means when they say “observer” in the context of quantum physics. Different thinkers seem to have differing views of what it means to be an observer, but rarely are the articulated. Instead it is often left up to those listening or reading to reverse-engineer a notion of “observer” from the arguments made. It is my contention that this vagueness of definition often aids one in being lead down the path towards epistemic radical scepticism, and that if we can unwind the various possibilities of what it means to be an observer, then we can better understand how some thinkers end up reaching these radically sceptical conclusions.

So what do we mean when we say “observer?” First I will discuss what I call the *common sense* interpretation of what it means to be an observer.†

The Common Sense Observer

I think it is fairly safe to say that most people, when confronted with the term “observer”, would say that it means something like: a *person* who *sees* something.

*I should be clear that in some ways I act as a pop-physicist here. My understanding of quantum physics stops somewhere around where the mathematics begins. But, as a philosopher I am fascinated with the conclusions that can be drawn from what some quantum physicists claim. These claims have immediate relevance to philosophy and epistemology. Further, I strongly believe many of the more radical claims of quantum physicists belong at least partially in the realm of philosophy, not just mathematics.

†To be clear, I do not take the term “common sense” to necessarily have positive connotations. Very often “common sense” is used in a way that simply appeals to the existing biases of the listener, allowing the arguer to hand-wave away important premises of their argument, by declaring it to be so obvious that everyone must automatically agree. In this sense, I use the term “common sense” to refer to a form of argumentation that hides or exempts from criticism a premise that people find intuitive, but may be false or misleading.

This may seem ridiculously obvious, to the point that it might almost not be worth mentioning. But, in the context of the observer effect and quantum physics it is not a given that this is the most appropriate definition. Nonetheless, I believe that this is the definition that most people would agree to if pressed about it. I also think it is fairly safe to say that most people, when listening to philosophers, quantum physicists, or pop-physicists, tacitly understand this to be what someone means when they say “observer.”

Epistemic Radical Scepticism and the Common Sense Observer

The claim of the radically sceptical quantum physicist is that quantum fields do not collapse into a certain state unless they are being observed. The next step, given the common sense conception of the term “observer,” is to conclude that we (*people* who can *see*, and thus observe) must see something for it to exist in the concrete sense that we all understand. If a *person* does not *see* something, it is no more than unrealized quantum potential, which we fundamentally cannot experience first hand.*

The radically sceptical quantum physicist claims that what we understand as a concrete state is in fact an incomplete representation of the more fundamental quantum world. The radically sceptical quantum physicist’s claim may be: quantum physics tells us the world works in a way that our eyes are in principle incapable of seeing, due to it changing under observation, and so our knowledge of the world is inherently flawed. “Observer” means “*person* who *sees* something,” and no person can directly see quantum particles and fields, only what they become under observation.

In accepting the common sense understanding of observation we have already conceded a conflation of “observation” for “sight.” But, this may be fine so long as we can come to understand how observation through sight may work given the observation effect.

Observation Through Sight

In order to have an understanding of observation through sight we will have to dig into what it means to *see*. A cursory understanding that I believe most people are familiar with might be: when we see something it is because light rays hit a surface, for example a wall, bounced off of it and made their way to our eyes, where the light affected the photoreceptive parts, which sent a signal to our brains so that we consciously saw what the light had illuminated. This description may gloss over much of what happens, but in the spirit of the common sense notion of observation that we have identified, I believe this definition captures well enough what many people understand *seeing* to be.

But we have run into a problem: in this understanding of what it is to see, and thus observe, there is a person seeing something, but it is not really the wall they are seeing, it is *the light*. Further, the wall does not know, so to speak, that the light that previously hit it has gone into our eyes. Likewise, the

*On social media I encountered an enthusiast of Donald Hoffman’s understanding of quantum physics being asked if dogs counted as observers, and their answer was simply “I don’t know.” While I wouldn’t take this person to be representative of quantum physics as a whole by any means, they seemed to be much more familiar with Donald Hoffman’s understanding of quantum physics than I was. They are at least representative of *some* understanding of quantum physics, while also seeming not to have any explanation of what it means to be an observer, and as such I think it is valuable to analyze these sorts of positions.

light itself, other than having its wavelength and frequency modified by bouncing off the wall, does not “know” that it hit a wall and then went into the eyes of an observer. The light is merely bouncing around in a mechanical manner as light must.

It is unclear how conscious observation through sight links back to the quantum world to trigger the collapse of the quantum field being observed, so that it may settle into a concrete state that we are able to perceive. It is not at all obvious how the act of seeing light can leap out of our consciousness, or eyes, and directly affect this quantum world, which is otherwise totally inaccessible to us. It makes intuitive sense that observation is *seeing*, but when applied to the observation effect the result is not just unintuitive, but totally opaque.

The Observer Effect and the Unseeable

Even more difficult issues arise when we note that many parts of the universe have no conscious beings to see them, yet those unobserved things still behave in a way that establishes that they other than unrealized quantum potential.

Take for example the centre of the Earth. The centre of the Earth is filled with liquid hot magma. We know this at least in part because liquid hot magma bubbles up to the surface sometimes from certain parts of the planet. But, there are presumably no observers in the centre of the Earth, nor could there be given the immense pressure and heat.* Since there are no observers in the centre of the Earth, there should be no way for what is down there to go from a state of unrealized quantum potential to magma as we know it, and if this is the case, then it seems very strange to imagine that a mass of quantum probability has somehow interacted in such a way as to make magma predictably push its way to the surface of the earth. It seems we must believe that the fields of quantum uncertainty in the centre of the Earth somehow still behave like concrete matter as usual, despite being in an un-collapsed state of quantum uncertainty, pushing fields of un-collapsed quantum-*proto-magma* to the surface, where observers can see them and cause them to be set into the magma that we recognize.

This case seems to push our notions of the observation effect and reality to absurdity. Are we to believe that the magma we see at the surface of the Earth is “real” so to speak, but that somewhere below it is a field of quantum possibility, not yet collapsed into being, that produced it? How far must we go beyond our direct observations to get to something that is a mere field of quantum possibility? At what point does our observation stop working, so to speak? Answers to these question are not easily forthcoming, to say the very least.

Further, if the unobserved fields of quantum potential at the centre of the Earth act just like actual magma, pushing magma upwards to the surface through heat and pressure, then how can we say there is even any difference between the world we can observe and the other world of quantum uncertainty?

*Could bacteria, evolved to withstand high pressure and heat, observe what is going on in the centre of the Earth? It may seem a silly question, but it elucidates a clear issue with the common sense understanding of the observer effect: it is totally unclear what is “allowed” to observe. Humans can clearly observe, and bacteria react to their environment, so they are in some sense observing the world, but where the line is drawn between “real” observation and some other type of interaction with the environment seems arbitrary.

If there is no behavioural difference between the two, and we can only ever directly observe the world of collapsed quantum fields that we recognize in our day to day, then it seems we have made a distinction between two states of being that doesn't actually make any difference; they both act the same. This runs directly counter to the radically sceptical quantum physicist's claim that our observed reality is somehow not real enough, and that the world of quantum potential is the more fundamental version of existence that we cannot access; instead the two are just the same, except that there is one, the world of unrealized quantum potential, that we in principle cannot directly observe.

The common sense notion of observation becomes even more bizarre if we simply take the next logical step in the above line of reasoning and note that no one can directly observe the inside of any opaque object. I can see the outside of a baseball, for example, but I cannot see the cork, rubber and so forth inside. It seems especially absurd to claim that the inside of a baseball, which is not being observed, is in a state of un-collapsed quantum fields of potential, floating around inside a shell of observed, and thus collapsed, baseball skin. How could a baseball, which requires a certain density and elasticity in its core, work the way it does if its unobserved insides are a field of unrealized quantum potential? Do we have to assume that the baseball was created in a process that involved the inside of it first being exposed to observation, and thus being realized into a particular configuration that no longer requires direct observation? What if no one first observed the inside of the baseball, creating it through some mechanical process unsupervised by anyone? Does the observation of the outside of the baseball somehow pass through to the inside of it? If we take seriously the common sense notion of observation, these simple questions create a host of issues for the radically sceptical quantum physicist's claim that observation creates the reality we know, hiding the more real world of quantum potential that lies beneath.

But, we may go down these rhetorical lines of questioning and decide that, yes, an observed object does stay collapsed into its state after being observed once, or that observation does pass through matter somehow. But, this seems to make unobserved fields of quantum potential almost impossible if we are around to observe almost anything at all. Suddenly, even things we don't observe are in a concrete state that we can apprehend, and so the radically sceptical quantum physicist's claim that our knowledge of the world is incomplete or weak seems to miss the mark; our understanding of the world, even of parts we don't directly observe, is accurate given that everything around us essentially has to be in a state that we are familiar with, understand, and can have knowledge about. When I turn my back to a tree I am not releasing it from the shackles of the deterministic world into the more fundamental quantum world that we cannot see, we are just seeing a tree and then not seeing it while it remains in a collapsed, concrete state.

Observation Through Non-sight Senses

We could perhaps widen our notion of observation to include hearing, smelling and so on. This, I think, goes against the common sense notion of observation, which most would consider to be just visual observation. But if pressed I imagine many would likely agree that hearing, smelling and other senses

are in fact a form of observation, even if they aren't quite as intuitively understood to be observation, as visual observation is.

With these extra senses we can imagine that perhaps the sound waves bouncing off a baseball travel to our ears, just as light bounces off an object into our eyes, so that the baseball is being observed, in a peculiar way, by someone hearing the ball. It seems reasonable that if someone hears a baseball being hit by a bat, that they have aurally observed the ball, and thus that it has been collapsed into a particular quantum state and is more than quantum potential. Likewise, I suppose we could also say that someone who can't hear or see the baseball could smell the ball if they were close to it and were familiar with the smell of a baseball, and thus observe it through the sense of smell.*

Although including non-visual senses in the observation effect seems fairly reasonable in principle, we seem to be stretching the notion of observation into something bizarre and unintuitive. I can hear a bat hit a baseball, but presumably cannot hear a ball sitting still on the grass. If I am outside, blindfolded in the presence of a baseball that I have not observed and am unaware of, but I am aware of the wind blowing around me, does that mean the air around me and the baseball is collapsed into a concrete state, but the baseball is not? How much air around me is being observed? Is it just the air in my ears? What happens when air I have observed contacts the unobserved baseball? Instead of finding answers, strange questions about the practical reality of the observation effect pile up even more quickly when we add more senses.

So, even by allowing the common sense notion of observation a host of senses by which we can observe, it degrades quickly into absurdity when we try to apply it in the case of the observer effect. No matter how we try to maneuver, the common sense notion of observation breaks down badly when pressed by the peculiar nature of quantum physics. Rather than destroying our ability to attain knowledge about the world through observation, it seems reasonable to conclude that the common sense approach to observation is simply inadequate when dealing with quantum physics. The radically sceptical quantum physicist claims that our observations are in principle untrustworthy due to our inability to directly perceive the quantum world, but instead it seems likely that the very conception of observation presupposed by the sceptical argument cannot be reasonably applied to the world of quantum physics.

Unconscious Observation

We could take one further step in service of the common sense notion of observation and claim that one need not be immediately aware of their observation of something for it to affect the quantum state of it.

* These issues get even more complicated if we imagine that a recorder playing the sound of a baseball is heard by someone. There are of course shades of Gettier's understanding of knowledge requiring justified, true belief here. If someone aurally observes a recording of a baseball being hit, does the recorder collapse into a concrete state from quantum uncertainty? The recorder in a state of quantum uncertainty (if we can even call such a thing a recorder) doesn't "know" that it was heard and understood as a baseball being hit, but further it definitely also does not have justification or truth on its side. We can likewise ask if someone who smells a baseball, but does not know what a baseball smells like, has *truly* observed it, but these issues are likely outside the scope of this essay.

We could claim that we can, subconsciously perhaps, hear or smell or otherwise feel the inside of a baseball, so that it is being observed by us without us being immediately aware of the observation.

While I won't say that this is in principle not possible, it seems to push our notion of observation into truly ludicrous territory that barely resembles anything common sense any more. We would have to assert that for something to collapse from quantum uncertainty into a set state, that it must be observed by a conscious being, but that the act of observation can be unconscious. Further, in the case of particles that are not immediately in our field of observation, the observation *must be* unconscious. If this is what it takes for the common sense notion of observation to work under quantum physics, then it is a very peculiar state of affairs; we need consciousness *for* observation, but not consciousness *in* observation. This seems to relegate consciousness to a kind of cursory and ineffectual requirement, included only for the sake of our belief that only traditionally conscious beings can observe. This runs counter to the very value of the common sense notion of observation: that it is an intuitive and agreeable understanding of what it means to observe.

Non-conscious Observation

If I do not know that I am somehow observing the inside of the baseball, it seems *something* in the universe must “know” that the observation is happening in order for the quantum field to collapse, and that might as well be the inside of the baseball. At this point we have reached a twisted inversion of consciousness: I, unconsciously observing the inside of a baseball, while the baseball is in some manner consciously aware of my observing it, putting an enormous amount of agency on an inert object, while relegating my conscious perception to the backseat behind my unconscious observations. This is decidedly backwards from what I imagine anyone means when they try to elucidate what a common sense notion of observation might be.

If this is what we are stuck with, an almost incomprehensible “common sense” notion of observation, forced into an alien shape in order to make it align with the behaviour of quantum physics, then it seems reasonable to me to suggest that the common sense notion of observation is worth discarding from the context of quantum physics. There may be other more radical notions of observation that aren't forced into the half-measure of requiring a common sense understanding; if things are going to get so weird that we must admit the inside of the baseball is conscious of our observation but we, traditionally conscious beings, need not be directly consciously aware of the baseball, then we might as well do away with common sense, and instead take this line of reasoning to its logical conclusion. But, there is still at least one avenue to explore before we discard the common sense notion of observation.

Observation Through Physical Contact

There is the possibility that observation can happen through physical contact. This seems straightforwardly obvious, since we can observe our surroundings through touch. That is, we can be consciously aware of something near us by sensing it through touch, and thus actively observe it in some sense. In this way the keyboard I am typing on right now is being observed by my fingers, and

thus is collapsed into a concrete state, and is not a field of quantum possibility that may or may not be a keyboard, despite that I am not looking at it while I type.

But, we arrive almost immediately back to the problem that the keyboard must somehow *understand* that it is being touched by a conscious being, and not, for example, by a pen that has rolled off the desk onto it. How could the keyboard possibly “know,” so to speak, that the quantum particles and fields in my fingers that have come into contact with the quantum particles and fields of the keyboard are in fact that of a conscious entity capable of observing? If observation is what brings the keyboard into being, then a pen touching it by circumstance should not allow for it to come into existence, but a touch from me should.

Again, this seems like a serious point of friction between our common sense notion of observation and the observer effect: I am conscious, and I know I am touching the keys, but the keyboard is not, and does not know anything.

I believe we have reached an impasse here. We have exhausted all of the common sense aspects of observation that I can think of, and yet the radically sceptical quantum physicist can still claim our observations are inherently flawed due to the wildly divergent nature of the world as we observe it and the arguably more fundamental quantum world. Meanwhile, our analysis of the common sense notion of observation has led us to the absurd conclusion that the observer, who is necessary for reality to exist, plays less of a role than the object being observed, which itself somehow must “know” it is observed in some inexplicable way, while still requiring the conscious observer for its existence.

Quantum Anthropocentrism

It seems likely that in the discussion of quantum mechanics and the observer effect there is often a conflation, intentional or not, of the common sense notion of observation and some other notion of observation that must be much more particular to quantum physics. The quantum physicist says that observation creates reality, such that quantum particles and fields collapse into a state of certainty from mere potential, with a particular understanding of “observation” in mind, but many people hearing this claim end up believing that they, *specifically*, create reality by looking at the world in the common sense that most of us understand.

This is a wildly anthropocentric understanding of reality that puts far more agency onto us as humans than is necessary or even reasonable, and it is this tacit conceptual switch from observation as a technical term in quantum physics to observation in the common sense that leads us to this highly ego-centric conclusion that you or I, *specifically*, create reality. The fact that this anthropocentric understanding of observation also, paradoxically, leads us to radically doubt the very reality that we apparently create, is just another strike against the common sense notion of observation, by my estimation.

While the observer effect is often described as a phenomenon that invalidates our understanding of the world in a radically sceptical manner, it also requires that us conscious agents be part and parcel with the universe. That is to say, the observer effect asserts that we are not outside agents observing the universe and all its quantum particles and fields from above so to speak, but that we are inherently *part of* the universe. That is to say we are made up of quantum particles in the universe like everything else, and thus by necessity we are part of the universe, while also observing the universe. Thus we are the universe observing itself, although it becomes a bit difficult to use terms such as “we” or “I” while acknowledging this.

But this leads to tension in the radically sceptical story about the observer effect: we are necessarily inseparable from the universe that we observe and which responds to our observation, but at the same time, the universe is much different than what we observe, due to the uncertain nature of quantum potential. This, some people claim, means our senses are wildly inaccurate identifiers of what the world is *really* like, and are only good for survival, not knowledge. Yet, at the same time we are told the known universe only “exists” as it does through observation, the very same observation that is incorrect and not representative of *true* reality.

While I wouldn’t say these points are straightforwardly contradictory, it seems clear the something peculiar is going on. We have been told that our observation of the universe “creates” reality so to speak, which I would argue is an unreasonably anthropocentric view that puts us (and perhaps all conscious entities) at the helm of the universe, defining reality.* But at the same time we are also told

*I would say that the geocentric model is to astronomy what the observer effect is to reality in this line of reasoning. We are not at the centre of the universe, nor are we at the centre of reality, so to speak.

that we are not individual entities at all, that we are inextricably part of the universe, while *also* being told that the very observation of the universe that “reality” (whatever we make of that term) depends upon is exceedingly inaccurate, a mere shadow of the true reality of quantum fields, potential and uncertainty. All this, despite us being in principle part of the universe that we apparently don’t and can’t understand first hand.

This is all to point out what I hope is now obvious: that whatever notion of “observation” that quantum physics requires when speaking of the observer effect is so disconnected from the notion of conscious observation that most of us understand, that they cannot even be compared.

Some may accuse me of being pedantic here, that I am merely toying with definition when what matters is truth. I would instead argue that the radically sceptical quantum theorists who claim that observation creates reality use the term “observe” loosely or without the right level of scrutiny. Pointing out that there is a difference between the widely accepted understanding of “observation” and the understanding required by quantum physics is necessary to avoid the sort of epistemically, radically sceptical anthropocentrism that results from these vague definitions.

Building A New Understanding of Observation and Consciousness

I think that I have made a strong case that the common sense notion of observation is not just inadequate for use in the context of quantum physics, but detrimental, in that it leads us down an epistemic dead end path. The common sense understanding of observation is intuitively appealing, and works well enough when we are speaking of everyday epistemic situations, but when applied to the uncertain, minuscule world of quantum physics, the observer effect, and all their peculiarities, it crumbles under the pressure of most any line of reasoning.

For this reason I strongly believe that we must begin building an alternate understanding of what is to observe, and thus what it is to be conscious. This understanding of observation and consciousness must avoid epistemic radical scepticism, while also allowing for the uncertainty that inherently exists in quantum physics. As such, it must be a radical reinterpretation of our understanding of observation that isn’t held back by familiar, common sense understandings.

In the next section, I lay out the beginnings of what this radical interpretation of observation, and thus consciousness, may look like, given the failings of the common sense notion of observation, and the fundamentally inaccessible nature of the quantum world.

Observation Through Quantum Interaction

We ran into a problem when utilizing the common sense notion of “observation”: visual observation involves light hitting a surface and then reaching our eyes, but how does the surface *know* that the light reached some the eyes of a conscious being, capable of observing? Likewise, if I touch a keyboard, how does the keyboard know that I, a conscious observer, did so, and not an inanimate object? If conscious observation is required, then there is a severe disconnect between the observer and the observed when we rely on the common sense notion of observation.

But, the previous line of reasoning leads us to another possible conception of what “observation” means that we have been skirting around: that observation is the physical interaction of quantum particles. That is, when we see the wall, the wall does not somehow know that it is being observed by me, it only knows, in the sense that its particles were affected by some light waves/particles, that it was contacted by light, and may thus be collapsed from a field of quantum possibility into a set state. This may seem like a bizarre statement, because now we have *no* traditionally conscious observer. Instead, the observation is being done by what we would consider non-conscious quantum particles interacting physically. But, given the difficulties we encountered with the common sense notion of observation, an alternative notion of observation, and thus consciousness, must be considered.

The result of this conception of observation is somewhat extraordinary: *every* particle in the universe is an observer, with the potential to observe every other particle in the universe. It seems to me that this makes good sense from a quantum physics perspective: a quantum particle cannot know that other quantum particles, that happen to be part of a structure organized in such a way as to make them what we would call a conscious person, are observing it through visual or other senses. There is, as far as I know, not some sort of feedback mechanism that allows a quantum particle in a state of uncertainty to get the message that it has been observed by a conscious entity like a human.* All a quantum particle can do is affect and be affected by other quantum particles.

At this point, I believe, we have disconnected from any notion of *observation* that most people would agree to: when I say I am observing a cup of water I mean that I, a conscious entity, had light bounce off the cup into my eyes, and then through the enormous array of processes of the brain, nerves, corneas, my consciousness (whatever we take that to be) and so on, was able to interpret that light as a clear glass cup with water in it. This process does not involve just quantum particles interacting with one another. It goes far beyond the mere interaction of particles as energy-exchanging entities and into notions of awareness and consciousness, broadly speaking.

* Could quantum linking be at work here? It acts over any distance instantly, and so would make sense as a feedback mechanism for quantum collapse through observation. But as far as I understand it, quantum linking is a very particular phenomenon that only occurs in very specific, scientifically contrived circumstances. I also understand that quantum linking as a scientifically reproducible phenomenon occurs for only microseconds, but perhaps that is all the time that is needed for quantum field collapse to be triggered. Nonetheless, it is a bit hard to believe that quantum linking is somehow at work *every* time someone observes the world, but with my limited knowledge of such things it is hard to say if this is a valid line of reasoning.

Still, this is fine I think. Our common sense notion of observations-as-senses need not line up exactly with the notion of observation that quantum physics requires for either of them to be useful or correct. If anything, the common sense notion of observation led us down a strange path in which we are either completely stripped of the capability of knowledge through radical scepticism, or we are left with a severe clash between the intuitive, common sense understanding of observation and the extraordinary conclusion that observation creates reality through some completely opaque method of feedback from conscious observation to quantum field collapse. So, I think it is necessary to move beyond our intuitive understanding of observation into something less immediately recognizable as the sort of observation we do under normal circumstances.

Consciousness at the Quantum Scale

If we take seriously the idea that a quantum particle can observe other particles through contact, or at least the interaction of particles exerting some sort of force on one another,* we run into the problem that this notion of observation differs deeply from what we mean when we say “I observed a peregrine”, for example, due to the necessary inclusion of consciousness in our common sense notion of observation.

Here we have reached another possibility that several quantum theorists have argued: that consciousness is a fundamental part of the universe and thus a fundamental part of quantum particles themselves. Setting aside our notions of what or who can be conscious, if we were to imagine a being that was constrained to the physical limits of a quantum particle, how could it behave? It would only have two[†] states determining how it could consciously interact with and react to its environment: it could either be stuck in a state of quantum uncertainty, trapped in a field of probability where it can’t at that moment choose *anything*, or it can collapse into a state with a particular position, spin, velocity, etc. when another particle is nearby to observe it. Once it is either observing or being observed it can choose a state, so to speak. Of course the options of what states it can choose to be in are limited by the other particle(s) it is being observed by, but in this limited set of choices we can imagine a very limited state of consciousness: a narrow form of consciousness limited by the constraints of the quantum particle and its quantum neighbours.

As humans, people, and conscious beings we have “full” consciousness, so to speak.[‡] We see things, can choose to move towards them, touch them, pick them up, smell them, communicate with them

* For example, an electron and proton linking together through positive and negative charges would be two particles contacting, so to speak, and thus observing each other.

† I am fully open to the possibility that there are more than two options here. I won’t pretend to understand quantum physics to the degree that I could safely say there are only two options here. But for the sake of this discussion, I think this is a fairly reasonable starting point. If anything, more options allow for richer consciousness than the sort of binary consciousness detailed here.

‡ I would never assert that humans’ form of consciousness is somehow the most complete form of consciousness. But in the context of very limited forms of consciousness, I believe our consciousness to be “full” in the sense that it is obvious that we are conscious in the traditional sense. It is less obvious that a bacterium is conscious, even less so a quantum particle, given traditional understandings of consciousness. But, limiting our notion of consciousness to only that of “full” consciousness, our consciousness, is once again an anthropocentric mistake.

through language if they can also communicate, and so on. We are able to do all these things because of our physical configuration: we have brains, nervous systems, sensory organs, thoughts, memories and so on. A quantum particle has an extremely limited physical configuration, at least compared to us, and thus there isn't much it can choose to do. Nonetheless, the *exact* state it ends up in, its spin, velocity, position, etc, is chosen from a set of possible configurations.* It is here, in a quantum particle's set of concrete, collapsed states that I contend a particle could be said to be consciously choosing.

Here I think there is really only one interpretation given the limited possibilities: a quantum particle is conscious in the sense that it reacts to other quantum particles, changing its state once it is observed by them, and changing their states by observing them as well. A proton knows that there is an electron near it because its state would be different, or even nonexistent, if there wasn't. Through their exchanges of energy they observe one another. This observation collapses particles from mere clouds of quantum potential into something "real": a proton, electron, or atom with a particular set of properties perhaps. The properties of a particle are chosen by it in the moment of collapse. Freed from a stateless situation of probability, a quantum particle is given a limited but concrete set of choices it can make once they are observed. Whether we, as observers in the common sense, can know what all of these properties are does not matter, because it is not our observation, necessarily, that is doing the work of quantum field collapse. Once observed, the quantum particle's fate is sealed, so to speak. It has entered the world of determinism, where it can no longer choose, and must instead behave mechanically according to its properties and environment; one understanding for the world of quantum physics, and one for the deterministic world we can directly observe and interact with.

Consciousness, Diversion of Definition and Reach of Observation

If we dig into this notion of consciousness like we dug into the common sense notion of observation, we once again come to a diversion of terms. It is easy to imagine that what we mean when say "I am conscious" is significantly different than saying "consciousness is a fundamental part of the universe and thus quantum particles are consciously observing the world around them." But once again, I don't think that this split in terms is necessarily a problem, so long as we understand that there are in fact two understandings of the term *conscious* that, while connected, are not the same.

But here we run into a peculiar problem of reach. When we spoke of conscious observation through sight or other sense, we ran into the issue that things we can't see or otherwise observe must not have collapsed into concrete forms, with the result being that parts of the world no one can observe would be stuck in a state of quantum uncertainty. The same difficulty occurs with particles that must be conscious of one another. We must ask, when exactly can two quantum particles observe one another through an exchange of energy? It seems as if they must be within a certain proximity, but how far does a quantum particle's consciousness reach? Science should be able to give us the answer to this, and

* Amplituhedrons seem to give a set of possible options for a quantum particle to choose from here. While I don't understand the mathematics behind them, I think amplituhedrons may make a compelling case that the choices available to a quantum particle can be defined explicitly.

perhaps has, but there are at least two distinct possibilities: that a quantum particle's consciousness has a specific reach, beyond which it cannot observe other particles, or that there is no limit to how far it reaches.

If a quantum particle's reach of consciousness is finite, then it must be possible to say that this electron and this proton are so far apart that they exchange no energy at all, and thus cannot observe one another, and thus cannot be conscious of one another. But there is a practical consideration here: there are, to understate the case significantly, a lot of particles in the universe, and the likelihood that any of them could ever be far enough apart to not be conscious of any other particles, and thus be in a state of quantum uncertainty, seems extremely low, at least for any part of the universe we are privy to.*

The particles in my hand are very close to the particles in the keyboard, which are very close to the particles inside the keyboard (which I can't see), which are close to some air particles, and so on for pretty much every bit of material on Earth. Practically speaking, it seems that every quantum particle must be conscious of many other particles at all times, just through happenstance of there being very many particles. In this way, the vast majority of quantum particles we could ever be concerned about are always collapsed into concrete states, instead of being in a state of quantum uncertainty, because all particles are observing some other particles by contingency.

The second possibility is that a quantum particle's consciousness has infinite reach, that one particle on one end of the universe and another particle on the other end of the universe exchange energy, albeit an amount of energy so fractional that it would be hard to fathom. These two particles, which are a finite distance apart, exchange a finite amount of energy divided by a finite amount of distance. The result is that energy is exchanged, even if it is a spectacularly small amount of energy, meaning the particles observe and are conscious of one another, meaning they are collapsed into a certain state.

* What about outer space? Outer space is a vacuum, could there realistically be uncollapsed quantum fields in the vacuum of space?

Conclusion

Both of the above results bring us to essentially the same conclusion: all particles are, at least contingently, always being observed by other quantum particles, are always conscious of some other. The existence of humanity, or any other traditionally conscious being, is not necessary for quantum particles to observe and be observed. That the world does not exist in uncertain fields of possibility until we observe it, but that the universe is almost by necessity permanently collapsed into a state of concrete being merely by the existence of other quantum particles. That speaking of the world as we know it as being uncertain until observed, as if the wall behind me only exists in a state of quantum suspension when I am not looking directly at it, is practically impossible, because all is being observed by all. Every part of the wall, every particle in it, observes some other particle in it. The universe observes itself and all it contains, *with* all it contains. Humanity is just another type of observer on top of all of the quantum particles that would be able to observe even without us here, and we are not a special type of collection of quantum particles that can collapse fields into concrete states with a mere glance.

This understanding of quantum observation and consciousness, I think, avoids the serious problems of anthropocentrism that arise from narrow conceptions of the observer effect, and also avoid the radically sceptical notion that our understanding of the world is epistemically flawed in a radical manner. We, or any traditionally conscious being, are not necessary for observation to occur. What we, as persons, observe in the common sense is not a false understanding of a universe that is a sea of untapped quantum possibility until we trick it into looking like something we understand, but a reliable representation of a great many particles that are, by necessity of other quantum particles observing each other, collapsed into a concrete and consistent state of reality at (almost) all times by being conscious of one another through exchange of energy.*

* One interesting possibility that arises out of the possibility that quantum particles have limits on how far their consciousness reaches: a vexing question is: "how big is the universe?" "how far away is the end of it? is there an end? and what could be on the 'other side'?" an answer, if you could call it that, may be that if quantum particles have limited reach of consciousness, then any particle that is being observed is part of the universe. But what of particles (really just fields of possibility) that exist somewhere so far away that they are not conscious of any other particles, and no particles conscious of them? This, we might say, is the edge of the universe. It may be that the universe is all that is observed (by all the other particles) and outside the universe is the vast field of quantum possibility that has been untapped, so to speak. Out there lies pure quantum possibility. One might also ask, what happens if we reach this edge of the universe? What would we see? The answer could be that by bringing our particles to that space of quantum possibility, and thus making them be observed, those fields of probability would be collapsed into reality. The edge of the universe could never really be reached, because the universe would be expanded, so to speak, by the mere presence of observing matter. Thus the universe is both finite, in that it only includes the finite array of quantum particles that have collapsed into certain states, and an infinite "space" of possibility, where quantum uncertainty is the only possibility until such a time as it is observed. This, I would say, is where the radically sceptical notion of reality being not as it seems could truly be talked about coherently. This "edge of the universe" remains necessarily forever out of our grasp, because even if we were to somehow travel the vast many light years it would take to get to it, it would instantly dissipate under observation, leaving a new unreachable frontier.