

## [Quantum Realism FAQ](#) *Brian Whitworth, May 2024.*

Some email questions about quantum realism and their answers. Email any further questions to [bwhitworth@acm.org](mailto:bwhitworth@acm.org)

*1. A universe as big as ours must be real.*

**Answer.** It is only “big” relative to us, just as we are big relative to bacteria. Our universe may be tiny compared to what contains it. We don’t know the scale of what is going on.

*2. A universe that has been going for billions of years must be real.*

**Answer.** Again, only relative to us. Our lifetime is just a flash compared to that of a planet, star or galaxy. In Hindu scriptures, a “day” of Brahma is about 4 billion years and in Buddhism a small Kalpa is about 16 billion years. Again, it all depends on scale.

*3. It would take a computer bigger than the universe to simulate it.*

**Answer.** A physical computer as big as our universe could only simulate a few molecules but quantum processing is much more powerful than physical processing (2.1.4). The nature of space suggests our universe is a 3D surface in a quantum bulk (2.4.1), so a quantum reality of the size of our universe could cause it.

*4. So who is the programmer?*

**Answer.** Why assume one being directs it? Whatever made the universe also made us, so to call it a being like us seems inadequate. We can reverse engineer physics but to say more is just speculation. You can check out what physics tells us in [Chapter 1](#) and what it might be behind it in [Chapter 7](#).

*5. Computers need physical hardware so the argument is circular. Processing based on the physical world can’t simulate the physical world. That’s recursive.*

**Answer.** That a physical world created itself is circular but that a quantum reality created it isn’t if that reality exists by itself. Physical processing needs hardware but quantum reality doesn’t, so this theory isn’t recursive.

*6. Can we hack into the system?*

**Answer.** We already do. Quantum computers tap into it but the no-cloning theorem (3.4) says we can’t alter quantum states by physical means. [Chapter 6](#) raises the possibility of an observer back-door and [Chapter 7](#) investigates this further.

*7. Is this like The Matrix, with Keanu Reeves as Neo?*

**Answer.** Definitely not. Neo dropped out of the Matrix reality into another physical world (5.7.1) but the quantum world that quantum theory describes isn't physical at all. It isn't possible for another physical world to generate our physical world ([Annex 1](#)).

8. *This just defers the problem of fully explaining everything to another level, so it can't be a theory of everything (TOE).*

**Answer.** Quantum and relativity theory dispelled the myth of a theory of everything (TOE) last century. Quantum realism is a query of everything not a theory of everything ([1.5.1](#)).

9. *If virtual reality calculations are performed by "something", it would be a system (like our Universe) that would need its own explanation, and we are back to square one, so to speak.*

**Answer.** The "something" you refer to is described by quantum theory, and it didn't leave us "back to square one" but one square further on. Likewise, a theory that unites quantum theory and relativity theory is another step ([5.1.1](#)). Science is about progress not perfection.

10. *A theory that some other world creates this world is not testable.*

**Answer.** It turns out that it is. A theory about heaven isn't testable because we can't define what heaven is, but a theory about the quantum world is testable because quantum theory defines it. Quantum realism is testable because we know how the physical world behaves and we know how quantum reality behaves ([4.5.9](#)).

11. *This is all just meta-physics, like the number of angels on a pinhead.*

**Answer.** Meta-physics is speculation on unknowable things but the quantum world is known by its physical results. Quantum realism is a statement about the world we see, so it isn't just meta-physics. Quantum waves don't need angels to produce physical events.

12. *This theory is unproven.*

**Answer.** So is physical realism! To fail one theory by a criterion that another also fails is bias. If science compares impartially, quantum realism explains more and assumes less.

13. *This theory is based on assumptions.*

**Answer.** So is every scientific theory. The scientific method assumes a hypothesis then tests it by physical data. Reverse engineering physical reality is design science ([1.5.2](#)).

14. *Denying the axiom that there is nothing outside the physical universe opens the floodgates to let anything convenient through, no matter how unlikely or even absurd.*

**Answer.** No floodgates open if we keep to the scientific method. Asking a question about physical reality is science, even if it happens to be "Is physical reality a quantum output?"

15. *This theory would end science, as you can't study what you can't by definition see.*

**Answer.** Not true, because science still works in a virtual reality ([1.2.6](#)). Science studies quarks no-one sees and it is fine. Science will end when we stop asking questions ([1.5.1](#)).

16. *A theory that postulates the unseen is not scientific.*

**Answer.** That science must only refer to observed things is logical positivism, a simplistic nineteenth century fallacy now discredited in many disciplines ([3.9.2](#)). Quantum theory is a science because science requires observable predictions, not observable theory constructs.

17. *This theory can never be decided.*

**Answer.** Of course it can. Science compares theories based on observable evidence. If it can decide that our universe had a beginning, it can decide that it is a quantum output.

18. *The theory contradicts Occam's razor.*

**Answer.** Occam's razor is to prefer the simplest theory that fits the facts ([1.6.1](#)). Last century it favored physical realism but today when space bends, time dilates and electrons teleport, Occam's razor cuts the other way. Compare the one quantum field and one core process of quantum realism with the five fields, thirty-eight core particles, sixteen charges, fourteen bosons and twenty-four ad hoc parameters of the standard model. Which is simpler?

19. *This is not mainstream physics.*

**Answer.** Of course it isn't. Nothing new is ever mainstream.

20. *This is a crazy idea.*

**Answer.** That doesn't make it untrue. That the earth is round was once a crazy idea. Science has always advanced by testing crazy ideas.

21. *This is just another God theory.*

**Answer.** Not so. God theories put no constraints on God but reverse engineering physical reality does ([1.5.2](#)). That quantum reality creates physical reality isn't a God theory because quantum theory constrains what quantum reality can do.

22. *Is the programmer God?*

**Answer.** Don't worry, we can still argue about God whether quantum reality exists or not, but how is God the programmer different from God the builder? We can call what made our universe God, or "the Suchness" as Buddhists do, but it is still a mystery.

23. *This model implies a phantom spirit world reality, alongside the physical world.*

**Answer.** Dualistic religions imply a phantom spiritual world alongside the physical world but quantum realism makes the physical world the phantom. Quantum reality is the great smoky dragon that breathed our physical world into existence ([3.9.6](#)).

24. *Does this mean that everything we see is just information in various forms?*

**Answer.** No. Information is a choice between physical states so it requires such states. A big program generating everything needs a big physical computer to run it, but that isn't possible ([Annex 1](#)). It is true that everything *we* know is based on the senses and nerve information but that doesn't mean the reality outside us is ([6.1.6](#)). Quantum realism is that everything comes from quantum processing based on qubits, not information based on bits ([2.1.4](#)).

25. *Where are the equations?*

**Answer.** They are already there, for example Schrödinger's equation describes a processing wave expanding in three-dimensions. We have equations already but where is the meaning?

26. *Equations that work are enough. Physics doesn't need meaning.*

**Answer.** This is Bohr's Copenhagen dogma that it is enough to carry on calculating ([3.1.4](#)). If you are happy with this, then fine, but why can't others wonder what it means?

27. *I don't think the world is a fake.*

**Answer.** Neither do I ([5.7.1](#)). A virtual reality is fake if it has no effect outside itself. For example, Monopoly money works in the game but is fake outside it. But our physical world alters the observer that quantum realism says is outside it. A universe that evolves the consciousness outside itself over time isn't fake ([6.3.13](#)).

28. *If the physical world is virtual, then we don't really exist!*

**Answer.** Not so. The physical body, like the pixels of a game avatar, doesn't really exist but the player outside the game isn't made of pixels and the physical world as a virtual reality also has an observer outside it. Reality 101 is that the observer must exist outside the space observed, and that means we do really exist ([6.3.1](#)).

29. *Whoever is playing my character is pretty boring.*

**Answer.** Sorry about that. Have you tried all the options? Try pressing different buttons.

30. *This contradicts common sense.*

**Answer.** Common sense also told us that the sun went around the earth, but it doesn't.

31. *This is not a new idea.*

**Answer.** True. It goes back at least to Plato's story of prisoners in a cave, taking their shadows on the wall to be reality (3.9.6). Modern virtualism precedents include Conrad Zuse, Edward Fredkin and Tom Campbell.

32. *Why would anyone create a world like this?*

**Answer.** We can only guess. Perhaps reality wanted to know itself and this was the only way? Our universe is a vast enterprise, created at great cost, so it probably isn't pointless.

33. *This theory makes no difference in practice.*

**Answer.** Yes it does. If light created matter, all the money spent colliding matter should have been spent colliding light (4.5.9), and the \$30 billion Higgs project just found another dead-end in the evolution of matter (4.4.7). Think of all the time and money wasted on WIMPs that don't exist (4.7.6), proton decay that doesn't happen, and bosons that aren't real.

34. *Are paranormal powers like healing and precognition implied?*

**Answer.** They aren't ruled out but why build a virtual world where players flout the rules? I don't see any glitches here. Quantum reality explores every option before writing a physical result, so there is no unfairness. There is no magical way to evade quantum laws.

35. *Could the experiments at CERN start a new big bang?*

**Answer.** No. Quantum reality created our universe from itself in a chain-reaction that made all the photons of our universe. Since then, no new photons have been created or destroyed, though some became matter. Over billions of years the universe has experienced extremes beyond anything we do, and that hasn't changed. To think that our accelerators can harm the quantum world is like online Sims thinking they can harm our world.

36. *Is this Seth Lloyd's theory that the Universe is in fact a giant quantum computer?*

**Answer.** No. Lloyd proposes quantum processing embedded in a fixed space and time which contradicts relativity, that there is no fixed space or time. If quantum processing creates our space and time, it can't exist in that space or time (1.4.1), so this theory is impossible.

37. *Does this imply the existence of a Creator?*

**Answer.** If by Creator you mean a super-being who looked down from above and created us, then no. If you mean that something bigger than the universe created it, then yes.

38. *How does this relate to Leonard Susskind's Holographic Principle?*

**Answer.** The Holographic principle, that everything physically knowable about a spatial volume transmits across the surface surrounding it, is a necessary prediction of quantum realism (3.8.6).

39. *Is this panpsychism?*

**Answer.** No. Panpsychism is that all the physical parts of nature (pan) have a psyche, which is a mind, spirit, or soul, however you interpret the Greek word. It relates to Plato's anima mundi, that a vital essence or pneuma (breath) animates the physical world. Nagel argues that panpsychism accepts materialism, that matter exists in and of itself, which quantum realism denies (6.1.8). If you want to label quantum realism, it is a neutral monism, that reality is neither mind nor matter, so it has nothing to do with either.

40. *Does quantum realism support evolution?*

**Answer.** Yes. It expands it to include the evolution of matter (4.8.3), so matter evolved as well as life. The evolution of matter is ongoing today in the stars, by nucleosynthesis. Every point of nature is constantly exploring every option, by the law of all action (3.6.3).

41. *Is there a place for the soul in quantum realism?*

**Answer.** In religious dualism, a non-physical soul exists inside the body, giving two realities, one within the other, so the soul is a non-physical entity in the physical body. In quantum realism, the quantum world isn't within physical reality at all, but rather the reverse. If you play a computer game, are you inside the game? You might think you are but really you aren't. Where does that leave the soul? Outside everything I guess.

42. *What about Einstein's statement "Reality is merely an illusion, albeit a very persistent one."*

**Answer.** The physical world that Einstein took to be real is an illusion, but that doesn't mean the observer that his theory required is an illusion.

43. *So does consciousness cause quantum effects, as suggested by Von Neumann and Henry Stapp, or does quantum activity cause consciousness, as suggested by Penrose?*

**Answer.** Quantum theory describes quantum waves that interact to cause physical events. What generates and restarts those waves also provides the ability to observe and choose, so consciousness as the ability to observe is a quantum reality property not a cause of its effects. Penrose's proposal that quantum activity causes consciousness applies on the cell scale. Tubulin synchrony lets billions of cell molecules act in a unified way, but it isn't enough for human consciousness. That requires billions of brain nerves to synchronize in a network resonance. Penrose proposed the cell part of the evolutionary story.

44. *Magritte painted a picture of a pipe entitled "This is not a pipe". Is this picture less real than the pipe he painted or are both real if I remember a pipe in my mind? Is the pipe painted by Magritte less real in my memory than the pipe that was a model for Magritte's picture?*

**Answer.** Layer upon layer doesn't alter the fundamentals. A painting of a pipe is a physical symbol of a physical object, so it isn't a pipe as Magritte said. A memory of a pipe is a neural reconstruction and so isn't a pipe either. The pipe Magritte painted was made of atoms that

are mostly empty space generated by quantum waves that aren't physical at all so it isn't the pipe as we imagine it. Seeing a pipe, remembering a pipe, and painting a pipe are real events but what is seen, remembered, or painted is not a pipe. The physical world should come with a label "*This is not reality*".

45. *Is consciousness, the feeling of "I", part of the brain? Is it independent of the physical realm? Is it simply the experience of reality? An emergent concept or a world in itself?*

**Answer.** The feeling of "I" can't come from the brain or anything physical at all. Yet the ability to observe relates to physical events because without them, observation is impossible. The experience of reality is real but the reality experienced isn't, as how can dead matter become conscious? It is, as you say, a world in itself, yet it needs physical events for some reason, or our universe wouldn't exist.

46. *What is conscious and what isn't?*

**Answer.** Everything is conscious on some scale. We can't imagine a photon being conscious but evolution is step by step, so no line can separate the first photons from us. In physics, a photon knows when a physicist blocks one of two slits and changes its behavior accordingly, to no longer produce an interference pattern. The only reasonable conclusion is that when a photon interacts with say an electron, it observes it on an infinitesimal scale.

47. *Are we dreaming?*

**Answer.** That life is a dream is solipsism, that the universe is created by our minds ([1.2.4](#)). A dream needs a dreamer but our universe doesn't need humanity to dream it because it existed for billions of years before we came along. If we die out something else will take our place – maybe rats will evolve sentience. We need to save our planet to save our species, not to save it. Life is not a dream because our acts have a real effect, on ourselves.

48. *What about free will? Do we have choice?*

**Answer.** Everything does. Choice existed from the beginning as a quantum reality property. We think only we choose but it began with the first light, as no physical history can predict where a photon hits a screen. It and it alone defines where its quantum wave collapses in a physical event, in a choice. We choose the same way when a brain wave collapses in a thought, feeling or action that changes the future timeline for ourselves and others. We choose what we do but others do too, so we don't always get what we want.

49. *I don't understand how everything observes, even a photon. How can a photon observe?*

**Answer.** It can at the Planck scale of time and space. In delayed choice experiments, photons change their behavior when observed ([3.8.3](#)), so when we observe a photon, it also observes us, but not on our scale. We can't see events less than a millisecond, so a 60 frame per second movie seems continuous to us but others can observe less than that. If we evolved from the

first light, then it is possible that infinitesimal photons have infinitesimal observations when they interact ([6.1.8](#)).

*50. Is time travel possible?*

**Answer.** No. Quantum theory implies that the past is gone and the future is undefined, so neither exist right now. One can't travel to what doesn't exist, and to do so creates impossible paradoxes ([2.3.2](#)). We have to live in the ever-present here and the eternal now.