

Quantum Theology beyond Copenhagen

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THE MANY WORRIES OF MANY WORLDS

by Emily Qureshi-Hurst

Abstract. Theological engagement with quantum mechanics has been dominated by the Copenhagen interpretation, failing to reflect the fact that philosophers and physicists alike are increasingly moving away from the Copenhagen interpretation in favor of other approaches. One such approach, Hugh Everett’s so-called Many Worlds Interpretation (MWI), is being taken increasingly seriously. As the MWI’s credibility grows, it is imperative that metaphysicians, theologians, and philosophers of religion engage with its ideas and their implications. This article does just that, setting out some implications of Everettian Quantum Mechanics that are particularly relevant to theism. It argues that taking seriously the radical consequences of the Everett interpretation means facing at least three major worries for theism pertaining to personal identity, the problem of evil, and salvation. The article concludes by calling on theologians and philosophers of religion to address these worries, in order that these matters of religious significance remain both coherent and credible if the MWI turns out to be correct.

Keywords: many worlds; personal identity; problem of evil; quantum mechanics; salvation

The weird and wonderful quantum world provides great scope for creative engagement, and contemplating quantum mechanics (henceforth QM) has led to excellent scholarship in both metaphysics and science-and-religion. The latter has largely been dominated by the Copenhagen interpretation, however, due to the Copenhagen interpretation’s monopoly

Emily Qureshi-Hurst is Junior Research Fellow at Pembroke College, University of Oxford and College Lecturer in Philosophy at Oriel College, University of Oxford, Faculty of Philosophy, University of Oxford, Oxford, UK; e-mail: emily.qureshi-hurst@philosophy.ox.ac.uk.

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over twentieth-a sub-atomic physics. Yet the Copenhagen interpretation is but one of many ways of interpreting the quantum formalism, each of which makes radically different ontological claims. In fact, many philosophers of physics now doubt whether the Copenhagen interpretation is a single, defensible interpretation at all. Tim Maudlin, for example, rejects it on the grounds that it is no more than a vague recipe that contains neither a clearly defined ontology nor an unambiguously formulated dynamical description of how that ontology evolves. Instead, it encourages the instrumental complacency of “shut up and calculate” (Maudlin 2019, xi). Fortunately, several well-defined and defensible interpretations exist to replace it. In recent years, one such interpretation, the Everett or Many Worlds Interpretation (henceforth MWI), has risen in prominence.

According to philosopher of physics and passionate Everettian David Wallace, MWI straightforwardly interprets QM as modelling the world, solving the measurement problem without positing any additional variables, collapse mechanisms, or modifications of the quantum formalism. It holds that taking the formalism as an accurate description of reality leads to the existence of a multiplicity of worlds in which many versions of us dwell. This fascinating possibility is worthy of serious engagement, as its metaphysical implications are potentially staggering. That its truth would force us to radically reconceptualize our understanding of physical reality (if not our everyday experience of said reality) is no exaggeration.

Wallace writes that MWI contains “philosophically and scientifically important discoveries; maybe (I don’t know) they’re even theologically important” (Wallace 2012, 273–74). I argue here that these *are* theologically important discoveries—several concepts important to both theology and the philosophy of religion may need to be revisited if MWI is true. Though there are many avenues to explore, in this article, I want to focus on the following questions: Who am I in Many Worlds? Is this a universe we should expect an all-loving God to create? And, how might salvation be possible in a Many Worlds framework? The aim of this article is firmly exploratory. I will suggest some worries that follow from Many Worlds and by drawing attention to these problem areas I hope to plot a path for future scholarship.

THE MANY WORLDS INTERPRETATION

Hugh Everett III first put forth his interpretation of QM in his doctoral dissertation, written at Princeton, in the 1950s. He worked under the supervision of John Wheeler who published his support for an edited down version of Everett’s ideas, though later distanced himself from Everett’s more radical conclusions (Everett 1957; Wheeler 1957; Barrett 2018). Initially, it was referred to as the Relative State formulation of QM. By 1973, Bryce DeWitt and Neill Graham had introduced the terminology “many

worlds” and compiled an edited volume containing Everett’s long PhD dissertation and several other shorter articles defending the position (DeWitt and Graham 1973).¹ Everett’s theory, in a nutshell, is this: there is a wavefunction of the universe, and this wavefunction obeys the Schrödinger equation. At a measurement event, and perhaps in all instances of decoherence, Everett argued that each outcome in the range of possible outcomes obtains (Albert and Loewer 1988, 197). They obtain, however, in different branches of the wavefunction that cease to interact with each other. These are the *many worlds*.

Wallace identifies two key features of MWI: first, it contains the contingent physical postulate that the universe is veridically represented by a unitary evolving quantum state; second, it contains the *a priori* claim that a realist interpretation leads to “a multiplicity of approximately classical, approximately non-interacting regions which look very much like the ‘classical world’” (Wallace 2012, 38). Though on first blush it seems highly radical and unparsimonious in the extreme, proponents of Everettian QM argue instead that it is the simplest interpretation of the mathematics. MWI takes the equations as mapping the actual state of the world without adding further postulates, hidden variables, or collapse mechanisms. As Everett wrote, his 1957 dissertation proposes “to regard pure wave mechanics as a complete theory. It postulates that a wave function that obeys a linear wave equation everywhere and at all times supplies a complete mathematical model for every isolated physical system without exception” (Everett 1957, 316). Wallace adds that on MWI “quantum mechanics can be taken literally. The only catch is that, when we do take it literally, the world turns out to be rather larger than we had anticipated” (Wallace 2012, 13). But what does this really mean?

MANY WORLDS’ METAPHYSICAL IMPLICATIONS

The metaphysical implications of MWI are undoubtedly extensive, although there remains much disagreement about precisely what they are. Unfortunately, these disputes cannot be covered in a single article, even less so in an article about MWI’s implications and not its hermeneutics. Wallace provides a helpful summary of MWI’s salient features, which is sufficient for our purposes:

Everettian quantum mechanics really is both a many-worlds and a many-minds theory, in the sense that it entails that there are a great many versions of myself, living in surroundings much like my own and interacting with other versions of *your* self, elsewhere in physical reality. The other worlds, and their inhabitants, are not abstracta, or fictions, or mere unrealized possibilities: if Everettian quantum mechanics is true, they are as real as I, you, and our mutual surroundings. (Wallace 2012, 3)

MWI states that there are (potentially a nondenumerable infinity of) worlds much like our own, containing people much like ourselves.² As Everett explains, “from the viewpoint of the theory all elements of a superposition (all ‘branches’) are ‘actual,’ none any more ‘real’ than the rest ... [the] total lack of effect of one branch on another also implies that no observer will ever be aware of any ‘splitting’ process” (Everett 1957, 459; c.f. Bryce 2010, 534). In answering a frequently asked question, namely “how much branching is there?,” David Wallace writes:

Branching is caused by any process which magnifies microscopic superpositions up to the level where decoherence kicks in, and there are basically three such processes:

1. Deliberate human experiments: Schrödinger’s cat, the two-slit experiment, Geiger counters, and the like.
2. ‘Natural quantum measurements’, such as occur when radiation causes cell mutation.
3. Classically chaotic processes, which cause small variations in initial conditions to grow exponentially, and so which cause quantum states which are initially spread over small regions in phase space to spread over macroscopically large ones. (Wallace 2010, 68)

Whilst the first is rather rare, the second two are ubiquitous. Yet despite their ubiquity, Wallace emphasizes that the question “how many branches?” cannot generate a clear answer, as there is no precise moment at which a branch “emerges” and ceases to interact with any of the others. Wallace claims that this question is as incoherent as the question “how many experiences did you have yesterday”—it makes sense to say that you had *many*, just not *how many*. So, the best answer we can give to the question ‘how many branches are there’ is *a lot* (Wallace 2010, 102).

One can unpack MWI’s metaphysical implications using the famous example of Schrödinger’s cat. The problem is as follows: a cat is locked in a box with a diabolical device that will break open a vial of poison if a radioactive particle decays. The likelihood of decay during the hour that the experiment runs is set at 0.5. Before measurement, textbook QM dictates that the particle is in a superposed state of both decayed and not decayed, leading to the paradoxical conclusion that the vial is broken and unbroken, and the cat is both alive and dead. Everettian QM solves this problem by claiming that this case does not involve a superposed alive-dead cat; rather, it involves superposed worlds, some of which contain live cats and some of which contain dead cats. In short, each possible outcome of a given event (e.g., decayed/not decayed; dead/alive) happens. Whichever state of affairs you observe when we open the box indicates which world *you* are in, but the other worlds are equally real.

There are several ways these worlds can be, and have been, understood.³ One way is to hold that, at a measurement event, the universe splits or branches leading to two or more worlds in which each possible outcome obtains. Such splitting is *fundamental*, on this understanding. This is perhaps the original view, held notably but not exclusively by David Deutsch and Bryce DeWitt (DeWitt 1970; Deutsch 1985) (Barrett 2018, section 7). On this view, Schrödinger's thought experiment involves the universe fundamentally splitting into "two simultaneous, noninteracting, but equally real worlds" containing each possible outcome (alive cat/dead cat) (DeWitt 1970, 31). For an excellent exposition of this version of MWI, see Barrett (2001, particularly chapter 6).

Another option, defended in recent years by David Wallace, Simon Saunders, and others, is to claim that splitting is *not* fundamental. Rather, the worlds are patterns in one universal quantum state that emerge as it evolves and its component parts become entangled with one another. Critical to understanding this view is the notion of decoherence, a dynamical process involving two systems (which can be approximately referred to as an object and its environment) that come to evolve distinctly from one another. Following decoherence, component parts of the wavefunction will enter states representable as a sum of noninteracting terms in a particular basis. Because of decoherence, interference between the various wavefunction branches is impossible. These systems then appear to behave classically from the perspective of individual branches, hence our first-person experience of a singular world (Ney 2013, 34).

On this view, when a system interacts with its environment, leading to decoherence, quasi-classical branches emerge from the quantum physics. Schrödinger's cat becomes entangled with the box, the box with its surroundings, and so on, leading to the emergence of two boxes, two rooms, two planets, and, ultimately, two worlds (Wallace 2012, chapter 2). Though these worlds are supervenient on the same microphysics and share identical histories, they now evolve independently (Wallace 2012, chapter 7). Because of the special way our universe evolves, it is not misleading to say that there are "many worlds," even if those worlds emerge from the complex behavior of the fundamental quantum state and are not themselves fundamental.

Wallace explains his use of emergence through the example of a Bengal tiger. Bengal tigers are real entities whose physical form, biological functionality, and behavior cannot be explained using only the Standard Model of particle physics. They are *patterns* that emerge at a macro-level of description, and their behavior cannot be described without macro-level linguistic apparatus. Whilst Bengal tigers are not independent of microphysical processes, neither are they explainable purely in terms of them. Similarly, the many worlds are nonfundamental (but concretely

real) patterns or structures that emerge macroscopically out of the evolving quantum state (Wallace 2012, chapters 2 and 3).

It is not within the scope of this article to decide between these alternatives.⁴ My concern is identifying and examining the *implications* of MWI for theism. Given this, the remainder of the article will take MWI as claiming that the universe splits or branches, this splitting is fundamental, and the worlds that ensue are as real as our own. Though this is not a universally accepted reading of MWI, its metaphysical implications are momentous, and it receives support from influential thinkers in the field (Deutsch 1985; DeWitt 1970). Therefore, it is worthy of theological engagement, caveated with an appropriate acknowledgement of hermeneutical uncertainty. If this radical reading of MWI is true, then there are many interesting implications to investigate. For example, on MWI there are myriad persons who share our past experiences, who have branched off from us, and will go on to live different futures. Who are these people? Are they versions of me? Should I care about what happens to them?

MANY WORLDS AND PERSONAL IDENTITY

Recently, I was invited to interview for my dream job. As I was incredibly nervous, one of the ways I tried to reassure myself (partly in jest) was by thinking, “if MWI is true then you probably *do* get the job in at least one world – you just have to hope that you end up in the right one!” Yet, in actuality, I would *not* find it reassuring to think that there is another version of me out there who got the job if the me in this world did not. From my perspective, that person certainly does not feel like me. Their future will deviate significantly from mine, and we will never meet again. Whether we have a shared past feels somewhat immaterial. I have no reason to care what happens to her once our paths diverge. In fact, I may not even be *any* of these future persons if I cannot survive branching. To shed light on these puzzles, we must turn to the philosophical literature on the persistence of personal identity through time.

How Do We Persist Through Time?

Almost all human persons have the intuition that we continue existing through time. Though we may colloquially say “I was a different person back then,” or “I will be a new woman moving forward,” we do not mean to say in any serious, substantial, or metaphysically meaningful sense that the person we were in the past or will be in the future is a qualitatively different human being than the person we are now. Without the belief that personal identity persists through time, such things as punishment for past crimes, property law, and reconnecting with an old friend, would not make sense. Because this is such a deeply held intuition, it has

received a substantial amount of philosophical attention spanning back to the ancient period.

Though there are several proposals for what constitutes one's continued existence through time (a.k.a. the persistence conditions of transtemporal identity), the most popular are (a) psychological continuity views and (b) brute physical relation views (Olsen 2019). The former holds that an individual's identity, and therefore their continued existence, depends on some form of psychological continuity. This may be continuity of first-person memory, of consciousness, or of some other psychological characteristic. Psychological continuity views preserve the intuition that we would survive if our consciousness were uploaded to a computer or if we woke up in a different body, but seem incompatible with the claim that I was a fetus or could ever enter into a persistent vegetative state, as neither of these involve consciousness in any recognizable sense.

Brute physical relation views propose physical persistence conditions, that is, an individual continues to exist if their body exists, and their existence can be traced back to each stage of their development (including prenatal). Generally, these views center around the claims that we are biological organisms, namely human animals, and our selfhood is inextricably bound up with our physical bodies. Whilst physical (sometimes, "animalist") views can comfortably accommodate the intuition that I was once a fetus, they are less compatible with the idea that a person could continue to exist in some futuristic setting in which their consciousness was separated from their body and their body destroyed.

One way that personal identity and persistence conditions are explored is through thought experiments that ask whether identity would be preserved in a range of scenarios involving altering or removing various characteristics. One such set of cases in the literature is known as "fission cases," which considers whether a person's identity could be preserved after splitting into two (or more) persons. Without MWI, fission cases are interesting but currently unrealizable philosophical exercises. MWI, however, implies that fission (albeit in a slightly different sense) may have been part of reality since long before philosophers existed to contemplate it.

Fission Cases

We now know that a person can survive the removal of one brain hemisphere with their psychological characteristics largely intact. Historically, philosophical discourse on fission cases has played on this idea, imagining what might happen if each hemisphere of an individual's brain were transplanted into two host bodies, resulting in two present persons (often referred to as *lefty* and *righty*) who are each psychologically continuous with one past person (Parfit 1984, chapter 12). I will begin by considering

fission as simply the splitting of an individual into two persons, each of whom is psychologically continuous with the pre-fission individual.

The problem is as follows: let a be a being who will at some future time t undergo fission, and let l and r be those two persons who exist post fission. After t , is a identical to *lefty*, *righty*, both, or neither? The physicalist must conclude that a has ceased to exist, as a 's original body is no more. However, both *lefty* and *righty* are psychologically continuous with a . If only one of them existed, it would seem like a straightforward case of continued existence according to the psychological continuity theorist. But how can we make sense of identity when there are multiple persons who have an equal claim to being a ?

According to Leibniz' law, if I am numerically identical with some object, I must share all the same properties with that object. Thus, if a is numerically identical with *lefty* and numerically identical with *righty*, meaning a shares all the same properties as *lefty* and *righty*, then, following the transitivity of numerical identity, *lefty* and *righty* must be numerically identical. Quite clearly, though, *lefty* and *righty* are not numerically identical, as they occupy distinct spatial locations, presumably have different streams of consciousness, and can operate entirely independently of one another. Thus, they do not share all the same properties, and so they are different persons. Another way of putting it is that, in the words of Derek Parfit, 'identity is a one-one relation,' and so collapses into incoherence when branching occurs (Parfit 1971, 10). Fission, then, is sufficient for a to cease existing.

Bodily continuity theorists are generally happy to accept this conclusion—the destruction of the original body constitutes a 's death. Perhaps matters are a little more complicated if the new body is an *exact* copy of the old body, but strictly speaking the destruction of the original body is a sufficient condition for a 's death. Things are more challenging for psychological continuity theorists, however, as they seem forced to conclude that both *lefty* and *righty* are identical to a by virtue of having psychological continuity with a , violating Leibniz' law. Two of the solutions to this problem that have been offered are the so-called multiple occupancy view, and the no-branching view (n.b. the "no branching" view refers to the branching of persons within a world in standard fission cases, and is not to be confused with the branching of worlds that we will come to shortly) (Olsen 2019).

The multiple occupancy view, in brief, claims that if there is fission in your future then there are multiple occupants in your body up until the fission occurs. Before t , a was actually *lefty* + *righty*. Both *lefty* and *righty* are psychologically continuous with a , as before t both *lefty* and *righty* were multiple occupants of a . Therefore, their identity is preserved post-fission. The no-branching view, on the other hand, holds a 's continued existence depends on any future persons' psychological continuity with a ,

and the added caveat that *no other being* is psychologically continuous with *a*. Therefore, the no-branching view claims that before *t*, *a* exists, and after *t*, *a* has ceased to exist. Instead, *lefty* and *righty* have come into existence. If just *righty* had come into existence, sharing psychological continuity with *a*, then *righty* would constitute the continued existence of *a*. Once *lefty* is introduced, however, *a* has ceased to exist, as an individual cannot survive a branching event. In short, fission is death.

Who Am I in Many Worlds?

Whether any of the above solutions are feasible in MWI is a highly important question. A brief defense of the multiple occupancy view, developed from ideas first presented by David Lewis (1976), is offered by Simon Saunders and David Wallace. Lewis claimed that the problem of continued identity post-fission can be solved by claiming that each person is made up of an aggregate of temporal parts or stages. On this view, if an individual will at some future time undergo branching into two copies, then there are timelessly two people, and the pre-branching individual's person stages are shared by both. One can attribute two sets of thoughts to these person stages, as there are two persons who later branch. So, at any one time, each "person" actually contains a multitude of overlapping person-stages whose futures will later diverge.

Although Saunders and Wallace acknowledge that Lewis' metaphysical view 'has won few supporters', they nonetheless propose applying it to MWI in the form of a semantic argument (Saunders and Wallace 2008, 295). Their aim is to address a common critique that MWI cannot accommodate probability and uncertainty particularly regarding what an individual should expect their future to hold (as everything physically possible happens, and these events are experienced by many versions of us). They propose that person stages are unaware of which future they will end up in as they cannot know which future branch is theirs, and that this solves the problem with accommodating uncertainty and probability within the Everettian picture. They argue that this use of indexical uncertainty, namely uncertainty about one's contextual location in future branches, recovers the notion of probability necessary for MWI to reflect quantum observations in which uncertainty and probability are incontrovertible.

Importantly, their primary concern is to develop a working semantics, not a robust metaphysics of transtemporal identity (Wallace and Saunders 2008, 303). This is because Saunders and Wallace deny that there *are* metaphysical truths about personhood and identity other than those fixed by our ordinary usage. Whilst they are not making robust metaphysical claims about identity, their argument is an example of how the multiple occupancy view might play out when talking about identity in an Everettian context. For the robust metaphysical argument, one should look to Lewis.

Parfit (rightly, in my view) notes that the multiple occupancy view “greatly distorts the concept of a person,” and should be rejected (Parfit 1984, 256). As I see it, whether the multiple occupancy/person stage view works for bifurcation is somewhat by-the-by—it collapses into absurdity in the context of MWI due to the sheer scales involved. In a recent popular book on MWI, physicist Sean Carroll writes:

We don’t know how often branching happens, or even whether that’s a sensible question to ask ... but we do know that there is a lot of branching going on; it happens every time a quantum system in a superposition becomes entangled with the environment. In a typical human body, about 5,000 atoms undergo radioactive decay every second. If decay branches the wavefunction in two, that’s 2^{5000} new branches every second. (Carroll 2021, 119–20)

If branching occurs as frequently as this, then at any one time I am not *one* person. Instead, I contain a *non-denumerable infinity* of persons/distinct person stages and am woefully mistaken in believing that I am one person whose experiences and perspectives are unique. This is both extremely difficult to square with our intuitive understanding of our own identity and hard to make metaphysical sense of—we would need extremely compelling reasons to accept such a conclusion.

Not only would we contain incomprehensible multitudes, but we would not even know *who* we are at any one time. Which of the multiple occupants or overlapping stages is *me*, if only one can be? There is no good answer to this question. Paul Tappenden agrees, writing: “an utterance of ‘I’ in Lewisian contexts of multiple utterance cannot straightforwardly be assumed to refer to the utterer. The semantic rule [‘the word “I” refers to the speaker in any sentence in which it occurs’] cannot be adopted without further ado” (Tappenden 2008). There is no means by which individuals can reliably refer to *themselves*, and not some other person-stage that will later branch off. Thus, the word “I” cannot have self-referential certainty. This is a significant problem for the multiple occupancy view.

Moreover, claiming that at each moment of our lives we contain perhaps an infinite number of overlapping persons who share our thoughts and experiences stretches our reasonable, common sense, understanding of identity beyond breaking point. Wallace and Saunders write that “intuition, if we are talking of physical discoveries, doesn’t come into it” (Wallace and Saunders 2008, 302), and “our intuitions about what is ‘reasonable’ or ‘imaginable’ were designed to aid our ancestors on the savannahs of Africa, and the universe is not obliged to conform to them” (Wallace 2010, 69). Yet I argue that (at least for the theist) our intuitive understanding of personal identity as a one-one relation between individuals and themselves (and not a one-many relation between an apparent individual and a non-denumerable infinity of person stages) must be in some sense meaningful.

We should not need to abandon the idea that “I” is a word by which we can, with certainty, refer to ourselves, unless provided with overwhelming evidence for doing so. Such evidence is not, in my view, available at present.

Happily, the no-branching view avoids these problems of overpopulation and self-referential uncertainty. Rather more unhappily, however, it implies that I cease to exist each time branching occurs. The postsplit persons are not *me*; they are new persons who have stepped fresh into existence as I was destroyed by the splitting of worlds. Yet this too feels totally alien to our intuitive understanding of our own identity as it leads to the conclusion that the six-year-old child I remember being is (a) not me and (b) is dead. Though I am psychologically continuous with the child, she has not survived the many branching events that have occurred in the twenty years that divides us. Moreover, the no-branching view holds that each person with whom I am psychologically continuous only exists for a very short time (if the above Carroll quotation is anything to go by, it may be as little as a fraction of a second). On this view, I am not even the same philosopher who started writing this article, even though I currently hold the ideas in my head, remember doing the research, and feel as though I have been writing it the whole time.

Even the bodily continuity class of persistence conditions cannot help here, for presumably individuals do not have the *exact same body* before and after the split. Before the split, there was one body; after the split, there are at least two. Much in the same way as the post-split persons have psychological continuity with the pre-split person without having the *exact same mind*, so too will the post-split persons feel as though they have bodily continuity although (following Leibniz’ law) it cannot be the *exact same body*. Clearly, whatever one’s views on persistence conditions are, Everettian branching presents significant problems for personal identity.

One possible solution is offered by Parfit, who argues that philosophers are mistaken in thinking that personal identity is what is most important in fission cases. We should not ask “am I identical with some past or future person,” but “*have I survived?*” Whilst identity is an all-or-nothing phenomenon, most of the relations important to survival admit of degrees (Parfit 1971, 11). Parfit argues that after *t*, *a* is identical neither with *lefty* nor *righty*, but that this does not matter. What we should care about is survival, even if the being that survives is not numerically identical with us. Furthermore, “we ought to regard division as being about as good as ordinary survival” (Parfit 1984, 261).

Carroll echoes this, writing that the idea that each of us is the exact same person from birth to death was never more than a useful approximation, so it should not be too concerning that MWI encourages us to abandon it. On MWI, we must accept that “the lifespan of a person should be thought of as a branching tree, with multiple individuals at any

one time, rather than a single trajectory – much like a splitting amoeba” (Carroll 2021, 139–40). There are many versions of us, each of whom can be traced back to an original person with whom all subsequent persons are psychologically continuous. So, on this view we survive, even if we need to reconceptualize exactly what this survival looks like.

Tappenden’s solution is to adopt the “stage view” of personal identity, developed by Theodore Sider, whereby persons are *not* an aggregate of person stages many of whom can be within a single individual at a given time (*à la* the multiple occupancy view) (Tappenden 2021, 2.1). Instead, persons *are* stages, and one individual contains maximally one person stage at any one time (Sider 1996, 441). Therefore, any utterance at a time has a token which is associated with the unique body, itself a stage, which is the body of that person at that time (Tappenden 2008).

This view is similar to perdurantism whereby persons are comprised of temporal parts and are thus never wholly present at any moment in their lives (*contra* eternalism in which persons persist in their totality through time). It differs, however, in its more radical claim that persons are not *comprised* of stages; they *are* stages (Sider 1996, 433). In applying this to MWI, Tappenden argues that an individual survives branching by being continuous with pre-branching temporal parts (*viz.* past temporal counterparts), and individuals who branch off each other share past parts but are not identical post-branching (*viz.* they do not share future temporal counterparts). Although detailed consideration of this view falls outside the scope of this article, I encourage the interested reader to turn to Tappenden for further discussion. My own feeling is that this is the most plausible option currently available.

Much has been covered and very little solved in the preceding paragraphs. If we take a no-branching or bodily continuity view, then the fission of many worlds is death. If we accept the multiple occupancy view, then we can survive branching but at a high price. We must dispose of our intuitions about the uniqueness of our identity, and we can no longer use the term *I* with self-referential certainty. If we take Parfit’s view, however, then we need not worry about fission cases of the kind incurred by MWI, as “the relation of the original person to each of the resulting people contains all that interests us – all that matters – in any ordinary case of survival” (Parfit 1971, 10). Tappenden’s view also allows persistence, whilst preserving our intuition that identity is both singular and self-referentially nonarbitrary.

Alleviating these worries is required to preserve the internal coherence of classical theism in the context of MWI. Theism holds that individuals have personal relationships with their God that are developed over their course of a lifetime. It also holds that individuals are held morally and eschatologically responsible for their actions in this life and the next. For this to remain coherent, it must be the case that individuals can continue to

exist throughout the various moments of their lives regardless of branching they may or may not undergo. If not, it seems deeply unjust to hold an individual responsible for sins committed by (a numerically nonidentical) earlier version of themselves. It also becomes hard to understand how an individual can cultivate and develop their ongoing relationship with God throughout their lifetime. In addition, whatever issues are raised for personal identity correspond with concerns regarding the soul. Can souls survive branching? Do they split? Do we contain multiple souls at any one time? These are highly important open questions.

Moreover, solving the personal identity problem in MWI is also important christologically. All the aforementioned issues relating to personal identity may be applied *mutatis mutandis* to the personal identity of Christ. If Christ cannot survive branching events, meaning he is not the exact same person at various points in his life, then this is problematic for the Christian. If the Christ crucified is not the Christ risen (because identity cannot be preserved after world-branching) then lots of theological problems arise regarding the eschatological promise of resurrection typified in the resurrection of Christ. Moreover, according to the Chalcedonian definition, Christ is the divine *Logos* incarnate. Either (1) Christ only exists in one branch (the branch in which the human body of Christ in that branch contains the unique divine *Logos*) meaning all other branches contain “zombie” Christs and the people in those branches are, in fact, worshipping idols, or (2) Christ’s *Logos* fragments into an infinite number of pieces as it undergoes the multitude of splitting events that occur during Christ’s lifetime. Each of these possibilities is theologically troubling. However pressing these problems are, it is not within this article’s scope to examine it in addition to the above discussion of personal identity. The salient point is this: if numerical identity cannot be squared with MWI, then theism faces serious problems. It is, therefore, of the utmost importance that the theist can make sense of the aforementioned issues surrounding personal identity in an Everettian context.

MANY WORLDS AND THE PROBLEM OF EVIL

Horrendous Evils and Maximal Suffering

The problem of evil holds that the God of classical theism possesses the attributes of omniscience, omnipotence, and perfect goodness, and therefore should be aware of evil, able to prevent or eliminate evil, and motivated to prevent or eliminate evil. Yet, evil exists. Therefore, the existence of a creator God with the aforementioned attributes is problematized. In this section, I argue that MWI raises both *new* and an *enlarged* versions of this problem to which fresh responses are required. I will develop both the new

and enlarged problems of evil in dialogue with Marilyn McCord Adams and Stuart Sutherland's article "Horrendous Evils and the Goodness of God." Adams and Sutherland identify a particular class of evils, the existence of which is especially problematic for the existence of the God of Christian theism, which they name *horrendous evils*. These are: "evils the participation in (the doing or suffering of) which gives one reason *prima facie* to doubt whether one's life could (given their inclusion in it) be a great good to one on the whole" (Adams and Sutherland 1989, 299). In other words, horrendous evils are evils so intensely devastating that experiencing them leads to doubt about whether one's life was worth living. From such evils, individuals may never recover.

On MWI, there must be versions of me living out the worst possible iteration of my life, including participating in horrendous evils. Everything that is physically possible (i.e., compatible with the initial conditions and the evolution of the universal wavefunction in accordance with the Schrödinger equation) happens, meaning that there will be versions of me suffering acutely from genetic diseases brought on by quantum effects on genetic mutation (Al Khalili and McFadden 2014) and versions of me in branches where many other forms of suffering abound. This problem has a relative dimension, insofar as those individuals are living a life that is (by comparison) far worse than other possible versions of their life. It also has an absolute dimension—those bad versions of an individual's life emerge by necessity out of the structure of the Everettian universe. If it is physically possible for versions of me to participate in evils, horrendous or otherwise, then there *are* versions of me in some branches who are participating in these. If Adams and Sutherland are right, then these versions of me are suffering to such a significant degree that the positive value of their life is utterly engulfed. There is reason to worry about this from an individual's perspective insofar as horrendous evils *will be* in at least one of their futures; there is also reason to worry about this from a God's eye perspective as there will be far more (beloved) individuals experiencing acute suffering if Everettian QM accurately describes reality. This is a state of affairs, I argue, that a loving God should want to prevent.

Whilst an optimistic theist may wish to invert the problem and claim many benefits to Everett's view (i.e., there are many versions of you living good, and some even living the best, versions of your life possible), the benefit to some is, I argue, vastly outweighed by the price others must pay. Morally, joy and suffering are not equal opposites—it is not justifiable to cause someone intense pain for no reason other than so you can feel an equally intense pleasure. Morality simply does not work like that.

Adams and Sutherland draw an important distinction between two descriptions of God that is helpful here. On the one hand, God is a provider of global goods, and on the other hand, God is a loving parent of each individual creature (Adams and Sutherland 1989, 302). Generic,

global solutions to evil (e.g., a free will defense) cannot solve individual problems because they ignore the latter description of God as a being who loves and cares for each individual person. Any such argument regarding a global distribution of goods and evils ignores the plight of the vastly increased number of individuals who suffer greatly, recognizing only the global provider aspect of the divine nature and ignoring that God is supposed to love each individual person. Though suffering may be balanced by the abundance of good on a global scale, for those individuals who suffer most, MWI is unimaginably cruel. Echoing the oft-referenced sentiment of Ivan Karamazov, a world that allows an innocent child to suffer in order that some other good is obtained is an abhorrent world in which we should not want to live.⁵ We ought not to take lightly the fact that *so many more* people exist to suffer acutely on MWI than in a singular universe, even if MWI contains a correspondingly greater amount of good. This is the enlarged version of the problem of evil.

The Problem of Evil as a Cosmological Problem

It is the case, however, that even if we inhabit a singular universe there exists an inordinate amount of suffering. Therefore, one might reasonably claim that whilst the problem of evil may be *enlarged* on MWI, we already have a rather large problem to contend with. Perhaps the Everettian world-view's contribution does little to reshape the contours of this ancient and persistent debate. For this reason, I wish also to set out how MWI raises the problem of evil in a new way, building on the arguments of the previous section. As aforementioned, suffering follows from the very structure of the Everettian world/s. It is no longer a contingent matter whether one's future will contain horrendous evils, extreme suffering, or profound loss. Somewhere in the Everettian world/s, there will be versions of you experiencing all these things. This gives a new string to the problem of evil's bow—if God exists then God chose to instantiate a particularly cruel set of physical laws that makes suffering emerge, by necessity, for a great many persons.

One can reasonably postulate that an omnipotent God could have created an entirely different set of physical laws to avoid this problem altogether. It seems that there are conceivable universes that obey quantum laws which an omnipotent God could have created that do not branch off *ad infinitum* creating a multiplicity of individuals many of whom are necessarily suffering greatly. Robert Russell calls arguments from, and responses to, evil that concern the very structure and laws of the universe “cosmic theodicies,” as they elevate the problem of evil to one of cosmology (Russell 2007, 124–25). Cosmic theodicies claim that we cannot blame God for certain evils as they are necessary consequences of some structural component of the universe. Russell rightly rejects the claim that

God did not have a choice about certain fundamentals of nature (e.g., whether the universe branches or not) when creating the world. Surely, Russell asks, a truly omnipotent God could have created another type of universe altogether, in which the cruelties of our own could have been avoided?

Cosmic theodicies only push the problem back one step. Instead of God being *directly* responsible for individual instances of suffering, God is *indirectly* responsible for suffering as God created the features of the universe which cause that suffering. Though God may not be directly responsible for the suffering of the unlucky Emilys, God *is* responsible for creating a universe in which the suffering of some Emilys (though it is initially arbitrary which ones) is inevitable. Indeed, if we *can* survive branching, then maximal suffering is necessarily in (at least one of) the future(s) of every single person. Why a loving God would choose such a design is an open question.

Though I have argued that this is a new version of the problem of evil, it bears important similarities to another theodical problem that has received recent attention in the science-and-religion literature: the problem of evolutionary theodicy. Both problems are grounded upon the claim that God chose morally reprehensible (or, at least, morally questionable) laws of nature from which evil and suffering follow by necessity. Just as the theory of evolution by natural selection contains intense suffering and vast waste for speciation to occur, so too do the laws of Everettian QM entail extreme suffering for a number of unfortunate individuals. Perhaps what we need in light of the previous discussion is an Everettian theodicy, which may resemble an evolutionary theodicy of the kind developed by those working in the biologically focused areas of science-and-religion and the philosophy of religion (Southgate 2008; Sollereder 2019). We are now able to turn to the final worry, which relates to both Christ and Salvation.

MANY WORLDS, CHRIST, AND SALVATION

The final worry for Many Worlds that I wish to discuss relates to the presence of Christ in our finite world. Scripture contains repeated references to the presence of Jesus Christ in creation during and beyond his lifetime. For example, “and remember I am with you always, to the end of the age” (Matthew 28:20 NRSV) and “the Word became flesh and dwelled among us” (John 1:14 NRSV). The purpose of this presence is to save the world from its fallen state, as is repeatedly referenced in Scripture: “For God so loved the world that he gave his one and only Son, that whoever believes in him shall not perish but have eternal life” (John 3:16 NRSV).

On MWI, it is possible, perhaps even probable, that there are branches of the universal wavefunction which do not include any person named Jesus of Nazareth. If one accepts that quantum processes play a role in

evolution, which is an increasingly popular view amongst scientists, then there will be many branches which radically differ from our own biologically. Recent arguments by Jim Al Khalili and Johnjoe McFadden, for example, claim that QM “is fundamental to heredity, since our genetic code is written in quantum particles” (Al Khalili and McFadden 2015, 308). If QM plays a significant role in genetics, mutations, and the speciation that occurs as a result of these, then the biological variation between some branches will be vast.

The truth of MWI seems to lead to the actual existence, somewhere in physical reality, of all possible evolutionary paths allowed by the quantum laws + the initial conditions. Some branches will have split from this one so far back in the past that their world will be utterly unrecognizable to us. The development of our planet and human evolution will have taken a completely different route. Some branches will not contain creatures we would call human beings, but many will. Indeed, it is likely that there will be many branches who split after the species *homo sapiens* evolved but before the either the Biblical narratives or the Christ event, leading to the existence of human beings with no epistemic access to the Christian God. Whether or not one believes this is *theologically* possible, if MWI is correct then it is *physically* possible. This raises another worry for Many Worlds: what will become of those individuals who, because of their location in the Everettian universe, cannot come to know God?

There are two adjacent problems here. First is the ontological problem of whether Christ exists in all branches in which human beings exist. The second is the epistemic problem of whether all the relevant individuals can have the epistemic access to Christ necessary for salvation. Although they are interrelated, they should not be conflated. Thomas Torrance’s exploration of the relation of physical space to the Incarnation is relevant to both these problems. The Incarnation has been of utmost importance since articulated in the Nicene Creed, which affirmed that the eternal Son of God “for us and for our salvation came down from heaven,” therefore claiming that God Himself is actively present within the space and time of our world. Torrance argues that time and space are created forms of rationality that exist in distinction from, but are related to, the rationality of God. He writes that the Incarnation “asserts the reality of space and time for God in the actuality of His relations with us, and at the same time binds us to space and time in all our relations with Him. We can no more contract out of space and time than we can contract out of the creature-Creator relationship” (Torrance 1969, 67).

Torrance goes as far as to say that now the Incarnation has occurred, all other conceivable routes to God within space and time have been invalidated. This act “forms the great axis in God’s relation with the world of space and time, apart from which our understanding of God and the world can only lose meaning” (Torrance 1969, 68). If Torrance is right, then the relationship between God and creatures in the spatiotemporal realm,

including creatures' ability to receive the Christian message and be saved, is inescapably bound up with shared spatiality. Christ entered the world of space and time, and through sharing that space with him individuals come to know him. Without the spatiotemporal context for the self-revelatory Incarnation event, its entire meaning is lost (Torrance 1969, 74). What this means for MWI is clear—if there are persons who exist in branches that do not contain Jesus Christ and the soteriologically significant events of his life, then they are unable to relate to God. God is not *in their space*, so to speak. In other words, the ontological problem leads to the epistemic problem. Without the existence of Christ in all branches, the relational knowledge of God necessary to attain salvation is impossible.

Torrance is not alone in arguing this—the Bible makes it clear that the route to salvation is through Jesus Christ alone: “salvation is found in no one else, for there is no other name under heaven given to mankind by which we must be saved” (Acts 4:12); “Jesus answered, ‘I am the way and the truth and the life. No one comes to the Father except through me’” (John 4:16). Though Christ can still be claimed to be *in* creation, he cannot be claimed to be *in all non-interacting branches* of that creation (with certainty). This means, at the very least, that the Christian message is epistemically inaccessible to all those who do not share a branch with any version of Christ. This conclusion pushes John Hick’s notion of epistemic distance, a gap in knowledge between humanity and God that is necessary for creatures to come to God freely, past breaking point (Hick 1990, 37). It is, therefore, a genuinely troubling possibility for the Christian worldview that there may be branches of the wavefunction in which Jesus is not present and is therefore inaccessible to the individuals inhabiting them. More work is necessary to confidently circumvent both the ontological problem and the epistemic problem. In effect, neither the presence, nor relational knowledge, of Christ is guaranteed in each branch. As we cannot interact with other worlds, it is likely that this open question will never receive a definitive answer. Nonetheless, it is worth considering what salvation might look like for those in branches which do not contain Christ and his soteriological work. It is to this final problem that we now turn.

ALLAYING A WORRY OF MANY WORLDS?

The best, and perhaps the only morally acceptable, model of salvation given MWI is that of universal salvation. Universal salvation, or universalism, is “the Christian doctrine that the death and resurrection of Jesus Christ is the divinely appointed means whereby God destroys sin and death in the end and thus brings eternal life to *all*” (Talbot 2007, 446, emphasis added). In other words, universalism is the claim that every created person will eventually be reconciled to God, no matter their personal shortcomings or misdeeds on this mortal plane. This view deviates from

many classical and biblically justified soteriologies in which salvation is only possible through Christ (perhaps through epistemic assent to certain theological propositions, good works, grace, or some combination of these), causing universalism to receive significant opposition in the Western theological canon.⁶

Nevertheless, a primary proponent of universalism in the modern era is John Hick, who also advocates religious pluralism according to which all great religions are genuine sources of divine revelation, and atonement can be attained through any of them (Hick 2010). Importantly in the context of MWI, universalism provides an explanation for how those who are unable to access Christ through no fault of their own are nonetheless able to be saved. Although Christ is not present in their branch, there are other means by which the inhabitants of that branch can reach atonement. These cases are analogous to those individuals who lived in a time before the Christ event, or who lived in a far-off region of the world that was not reached by Christianity during their lifetime. For them, the Christian message was fundamentally inaccessible—it seems immoral to hold them responsible for this, as one’s birthplace and birth-time is determined by a historico-geographical lottery. Salvation should not be decided on chance alone. Rather than the Christian having to claim that these individuals cannot be saved, universalism provides a framework in which their salvation is an inevitability. For those in branches which do not contain Christ, or in which the life events of Jesus of Nazareth played out differently, salvation is still within reach. For this reason, I argue that universalism is the only model of salvation in MWI that is both coherent and just.

FINAL REMARKS

I have argued that Hugh Everett’s so-called Many Worlds Interpretation of Quantum Mechanics raises many worries for theism, and for Christianity more specifically. Those considered here concerned personal identity, the problem of evil, and the interrelated issues of christology and soteriology. Many other worries remain to be explored, including: do we meet all the versions of ourselves in the afterlife? Does branching split the soul? Can we be held morally and eschatologically responsible for the actions of past versions of us, if branching does not allow continued *identity* (not simply survival) through time? Does MWI mean that Christ was crucified an infinite number of times in an infinite number of branches? Despite its seemingly outlandish science-fiction-like claims, Many Worlds appears to be here to stay. As it grows in credibility, theologians and philosophers of religion alike ought to engage with its implications and allay any worries that arise from its more radical conclusions. Then, if MWI is confirmed,

robust theological and metaphysical frameworks will already be in place which make sense of Christianity in an Everettian context.

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NOTES

1. For a more detailed history of MWI, see Byrne (2010).
2. It is important to note at this point that MWI is *not* equivalent to the modal multiverse in which everything that is logically possible occurs.
3. See Saunders (2010) for many excellent essays on the subject.
4. For an informative assessment of the merits and pitfalls of the various interpretations of QM (and the various readings of these interpretations), see Ney & Albert (2013) (especially the introduction).
5. Ivan's speech in Book V, Chapter IV of *The Brothers Karamazov*.
6. For a possible explanation of why this has been the case, see Talbot (2007, 449–59).

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