

What is “Intervention”?

ALVIN PLANTINGA

Abstract *I begin by noting that several theologians and others object to special divine action (divine intervention and action beyond conservation and creation) on the grounds that it is incompatible with science. These theologians are thinking of classical Newtonian science; I argue that in fact classical science is in no way incompatible with special divine action, including miracle. What is incompatible with special divine action is the Laplacean picture, which involves the causal closure of the universe. I then note that contemporary, quantum mechanical science doesn't even initially appear to be incompatible with special divine action. Nevertheless, many who are well aware of the quantum mechanical revolution (including some members of the Special Divine Action Project) still find a problem with special divine action, hoping to find an understanding of it that doesn't involve divine intervention. I argue that their objections to intervention are not sound. Furthermore, it isn't even possible to say what intervention is, given the quantum mechanical framework. I conclude by offering an account of special divine action that isn't open to their objections to intervention.*

Key words: Special divine action; Intervention; Creation; Conservation; Science; Classical science; Special Divine Action Project; Natural law; Newtonian science; Causal closure; Determinism; Laplace; Miracle; Quantum mechanics; Hands-off theology; Ghirardi–Rimini–Weber quantum mechanics; Schrödinger equation; Probability

Introduction

Well, I suppose it's a word. Perhaps the right question, or at any rate a better question, is: What is intervention? My question more exactly is something like this: What is meant by this word in the context of discussion of divine action in the world? Most of those who think about these things apparently disapprove of the suggestion that God acts in the world in such a way as to *intervene* in it.¹ But what exactly, or even approximately, *is* intervention? What sort of action would constitute intervention? And why would it be a bad thing? Perhaps my questions can be put like this: “What is intervention, that Thou must be mindful of it?”

We can begin by noting that most Christians and other theists have concurred with the Heidelberg Catechism:

Providence is the almighty and ever present power of God by which he upholds, as with his hand, heaven and earth and all creatures, and so rules them that leaf and blade, rain and drought, fruitful and lean years, food and drink, health and sickness,

prosperity and poverty—all things, in fact, come to us not by chance but from his fatherly hand. (Question 27)

Most Christians have concurred, that is, with the thought that God *acts* in the world he has created. According to the classical Christian and theistic view of God, he is a *person*. He is thus a being who has knowledge; he also has affections (he loves some things, hates others); he has ends and aims, and acts on the basis of his knowledge to achieve his ends. Furthermore, God is all-powerful, and all-knowing, and wholly good. Still further, God is a necessary being, exists in every possible world; so he has those properties in every possible world. God is therefore a necessarily existent concrete being (and the only necessarily existent concrete being).

Next, God has created our world. He may have done it in many different ways; he may have employed many different means; he may have done it all at once, or in stages; he may have done it relatively recently, or, more likely (given current science), billions of years ago. However he did it, Christians and other theists believe that he has in fact done it. Furthermore, he has created it “out of nothing”. This is not, of course, the absurd suggestion that “nothing” names a sort of substance or material or gunk—perhaps extremely thin and gossamer—out of which God fashioned the world; it is instead simply the denial that there was any such pre-existing material out of which God made the world.

Still further, God sustains the world in being. Apart from his sustaining hand, our universe—and if there are other universes, the same goes for them—would disappear like a candle flame in a high wind. Descartes and Jonathan Edwards, indeed, thought of this divine sustenance as a matter of re-creation: at every moment God re-creates his world. Maybe so, maybe not; the present point is only that God does indeed sustain his world in being, and, apart from that sustaining, supporting activity, the world would simply fail to exist. Some, including Thomas Aquinas, go even further: every causal transaction that takes place is such that God performs a special act of *concurring* with it; without that divine concurrence, the transaction could not take place.²

But (according to classical Christian and theistic belief) God acts in the world in ways that go beyond creation and sustenance. As the Heidelberg Catechism puts it (and again, classical theists of all stripes would agree), God so governs the world that whatever happens is to be thought of as “coming from his fatherly hand”: he either causes or permits whatever does in fact happen; none of it is to be thought of as a result of mere chance.³ And this governing—“ruling,” as the Catechism has it—comes in at least two parts. First of all, God governs the world in such a way that it displays regularity and predictability. Day follows night and night follows day; when there is rain and sun, plants grow; bread is good to eat, but mud is not; if you drop a rock from the top of a cliff, it will fall down, not up. It is only because of this regularity that we can build a house, design and manufacture automobiles and aircraft, cure diseases, raise crops, or pursue scientific projects. Indeed, it is only because of this regularity that we can act in any way at all. Further, most classical Christians would endorse something like John Calvin’s “Internal Witness of the Holy

Spirit” and Thomas Aquinas’ “Internal Instigation of the Holy Spirit.”⁴ “The believer,” says Aquinas, “has sufficient motive for believing, for he is moved by the authority of divine teaching confirmed by miracles and, what is more, *by the inward instigation of the divine invitation.*”⁵ So Aquinas and Calvin concur in the thought that it is by way of special divine action—action on the part of the Holy Spirit, the third person of the Trinity—that Christians come to see the truth of the central teachings of the gospel; the Holy Spirit gets them to see the “great truths of the gospel,” as Jonathan Edwards calls them.

There is still another kind of divine action. According to classical Christian belief, God sometimes does things differently, in such a way as to abrogate the usual regularities; he sometimes diverges from the way in which he ordinarily treats the stuff he has made. For example, there are miracles: in the Old Testament, the parting of the Red Sea and many others; in the New Testament, Jesus’ changing water into wine, walking on water, restoring a blind man’s sight, raising Lazarus, and, towering above all, Jesus himself rising from the dead. In short, God regularly and often causes events in the world—events that go beyond creation and conservation. We can think of divine action that goes beyond creation and conservation as *special* divine action.

The problem

In 1961, Langdon Gilkey wrote a widely influential article lamenting the condition of Biblical theology. The problem, he said, is that theologians speak the language of divine action in the world, the language of miracle and divine intervention. God has done wonderful things, so they say: he brought plagues upon the Egyptians (this one isn’t always emphasized by the theologians), he parted the Red Sea so that the children of Israel could walk through on dry ground, he fed them manna in the wilderness, he made the sun stand still. Jesus turned water into wine, fed a multitude with just five loaves and two fish, raised Lazarus from the dead, and was himself raised from the dead.

So far so good: where exactly is the problem? The problem, says Gilkey, is that modern theologians (he apparently includes himself) don’t really believe that God *did* any of those things—or, indeed, that he did anything at all:

Thus contemporary theology does not expect, nor does it speak of, wondrous divine events on the surface of natural and historical life. The causal nexus in space and time which the Enlightenment science and philosophy introduced into the Western mind . . . is also assumed by modern theologians and scholars; since they participate in the modern world of science both intellectually and existentially, they can scarcely do anything else. Now this assumption of a causal order among phenomenal events, and therefore of the authority of the scientific interpretation of observable events, makes a great difference. Suddenly a vast panoply of divine deeds and events recorded in scripture are no longer regarded as having actually happened . . . Whatever the Hebrews believed, *we* believe that the biblical people lived in the same causal continuum of space and time in which we live, and so one in which no divine wonders transpired and no divine voices were heard.⁶

These theologians, says Gilkey, speak the language of divine action, but they don't actually believe that God has acted: a lamentable hiatus between what they say (at least straightforwardly construed) and what they believe.

I reported Gilkey as saying that the theologians of whom he speaks don't believe that God does anything at all in the world; this isn't quite accurate. The theologians of whom Gilkey speaks didn't object to the idea that God has created and sustains the world. Their view is therefore quite compatible with God's acting in such a way as to preserve it in being. Where they have difficulty is with the thought that God does or has done anything *in addition to* creating the world and sustaining it in existence; creation and preservation, they think (or fear, or suspect), exhaust the divine activity. They have no objection to the thought that God has created the world, and works in it at a general level to preserve and sustain it; their objection is to the idea that God sometimes does something special, something beyond creation and preservation (and concurrence), something like guiding the course of history, or changing water into wine, or feeding five thousand with a few loaves and fishes. It is that *special* divine action that, from their point of view, is the problem. And when they speak of special divine action, they are thinking, among other things, of what are commonly called miracles (those "mighty acts"), and of divine *intervention* in the world. The thought is that God couldn't or wouldn't do a thing like that.

We could call this claim—the claim that God never intervenes in the world—"hands-off theology": God creates and sustains the world; as for the rest, he leaves it alone. Gilkey, of course, is not alone in proclaiming hands-off theology. Twenty years earlier, Rudolf Bultmann endorsed the "presupposition" that "history is a unity in the sense of a closed continuum of effects in which individual events are connected by the succession of cause and effect." This continuum, furthermore, "cannot be rent by the interference of supernatural, transcendent powers."⁷ (Bultmann apparently thought of the laws of nature as like the laws of the Medes and Persians (Daniel 6:8): once promulgated, not even the King can abrogate them; he also thought, apparently, that if God engaged in special divine action, he would be, not merely intervening, but actually (improperly?) *interfering* in the world.) John Macquarrie agrees:

The way of understanding miracle that appeals to breaks in the natural order and to supernatural interventions belongs to the mythological outlook and cannot commend itself in a post-mythological climate of thought ... The traditional conception of miracle is irreconcilable with our modern understanding of both science and history. Science proceeds on the assumption that whatever events occur in the world can be accounted for in terms of other events that also belong within the world; and if on some occasions we are unable to give a complete account of some happening ... the scientific conviction is that further research will bring to light further factors in the situation, but factors that will turn out to be just as immanent and this-worldly as those already known.⁸

The objection, then, is to special divine action, including in particular miracles; it would apparently also apply, however, to divine providence, and to the "internal instigation of the Holy Spirit" and "internal witness of the Holy Spirit" endorsed by Thomas Aquinas and John Calvin.⁹

Now *why* do these theologians object to special divine action? Why do they think that the causal continuum “cannot be rent by the interference of supernatural, transcendent powers,” that appeal to supernatural interventions “cannot commend itself in a post-mythological climate of thought”, and that “no wondrous divine events occur on the surface of natural and historical life”? Gilkey seems to believe that it is because they really can’t help themselves: “The causal nexus in space and time which Enlightenment science and philosophy introduced into the Western mind . . . is also assumed by modern theologians and scholars; since they participate in the modern world of science both intellectually and existentially, they can scarcely do anything else.” The thought seems to be that one who participates in the modern world of science both intellectually and existentially cannot help believing that God never acts specially or intervenes in the world. And, according to Bultmann, someone who avails herself of modern medicine and the wireless (not to mention, I suppose, television, computers, and cell phones that do email and double as cameras) can’t also believe in the spirit and wonder world of the New Testament.

Clearly, both of these claims deserve to be taken with a grain or two of salt. First, I personally have met people—physicists, for example—who participate in the modern world of science intellectually and existentially (if I understand what it is to participate in a world “existentially”) but nevertheless believe that God raised Jesus from the dead; that Jesus fed the five thousand and changed water into wine; that there are miraculous healings; that angels, and even Satan and his minions, are active in the world; and so on. (Furthermore, it is likely that many of these physicists have a rather better grasp of the physics of radio transmission—not to mention subsequent developments—than did Bultmann and his theological allies.) Indeed, if the relevant polls are to be trusted, some 40% of contemporary American scientists believe that God answers prayers—a percentage that has remained stable since 1915. At the least, Bultmann and Gilkey seem a bit unduly optimistic about the extent to which their beliefs are shared—could it be that they are generalizing on the basis of an unrepresentative sample, themselves and their friends, perhaps?¹⁰ And second, one suspects they also underestimate their own powers. My guess is, if they really tried hard, they could stop just assuming the existence of an unbroken causal nexus in the world, a nexus that precludes special divine action, and instead ask themselves whether there is really any reason to think this assumption *true*.

The old picture

Still, there is of course *some* connection between modern science and acceptance of hands-off theology. First, what sort of science is it that is relevant here? Gilkey mentions *eighteenth-century* science and philosophy. And indeed, the inspiration for views like those of Gilkey and others does come from eighteenth-century Enlightenment science—the classical science initiated by Sir Isaac Newton, so fateful for modern thought.¹¹ This is the physics of Newton’s laws of motion and gravity, and the later physics of electricity and magnetism represented by

Maxwell's Equations. This is the physics of the great conservation laws—the conservation of momentum, for example—and most essentially and most generally, the conservation of energy, especially as developed in the second half of the nineteenth century.¹²

But classical science, just by itself, is nowhere nearly sufficient for anti-interventionism. It's rather that there is a sort of world picture, a *Weltanschauung*, that is suggested by classical science, endorsed by many influential eighteenth- and nineteenth-century figures, and still accepted by these theologians. Or rather, there are at least two importantly different pictures here.

The Newtonian picture

First, there is the Newtonian picture properly so-called. According to this picture, the world (or at any rate the material universe) is like a great machine that proceeds according to fixed laws: Newton's laws of motion and the other pillars of classical science. These laws can be thought of as arising from the natures of the things God has created, so that (for example) it is part of the very nature of material particles and objects composed of them to attract each other with a force proportional to the product of their masses and inversely proportional to the square of the distance between them. Alternatively, we can think of matter as more acquiescent, and think of the laws as God's decrees as to how it shall in fact behave. In either case, we are to think of the universe as a whole—the material universe, anyway—as a collection including material particles and the things made of them, evolving according to the laws of classical science. Theologically (and this picture goes well beyond Newton himself), the idea is that the world is a great divine mechanical artifact¹³ that runs according to the fixed laws of classical science. The world is mechanical, in that the laws of physics are sufficient to describe its behavior; no further laws—of biology, for example—are needed; and if there are such laws, they are reducible (in a sense that never became very clear) to the laws of physics. On this picture, classical physics is in that respect complete. It is worth noting, of course, that it is no part of classical science as such to claim that physics *is* in this sense complete; this is a pious hope, or a philosophical add-on, or perhaps both, even if one that is at least rather naturally suggested by the success of physics.

But the Newtonian picture is nowhere nearly sufficient for anti-interventionism or hands-off theology. After all, Newton himself (one hopes) accepted something like the Newtonian picture; but Newton didn't accept hands-off theology. He believed that God regularly adjusts the orbits of the planets (otherwise, according to his calculations, their orbits would spiral off into chaos); he also believed that God providentially guides the world.

More important, however: as Newton and classical mechanics thought of the matter, the natural laws describe how the world works *when, or provided that, the world is a closed (isolated) system, subject to no outside causal influence*.¹⁴ In classical physics, Newton's laws and the great conservation laws deduced from them are stated for *closed* or *isolated* systems. Thus Sears and Zemanski's *University Physics*:

“this is the principle of conservation of linear momentum: *When no resultant external force acts on a system*, the total momentum of the system remains constant in magnitude and direction.”¹⁵ And the principle of conservation of energy states that “the internal energy of an isolated system remains constant. This is the most general statement of the principle of conservation of energy.”¹⁶

These principles, therefore, apply to *isolated* or *closed* systems. There is nothing here, then, to prevent God from changing the velocity or direction of a particle. If he did so, of course, energy would not be conserved in the system in question; but also, of course, that system in question would not be closed, in which case the principle of conservation of energy would not apply to it. Indeed, there is nothing here to prevent God from miraculously parting the waters of the Red Sea or causing a donkey to speak (Numbers 22:28), or bringing someone back to life, or for that matter creating *ex nihilo* a full-grown horse. It is perfectly possible for God to create *ex nihilo* a full-grown horse in the middle of Times Square without violating the principle of conservation of energy: that is because the relevant systems containing the horse would not be closed or isolated. For that very reason, there would be no violation of the principle of conservation of energy; that principle speaks only of closed or causally isolated systems—ones that are not subject to any outside causal influence. It says nothing at all about conservation of energy in systems that are *not* closed; and, of course, if God created a horse *ex nihilo* in Times Square, no relevant system containing that horse, including the whole of the material universe, would be closed.

Furthermore, it is no part of Newtonian mechanics or classical science generally to declare that the material universe *is* a closed system. You won’t find that claim in physics textbooks—naturally enough, since that claim isn’t part of physics. It is instead a metaphysical or theological add-on. (How could the causal closure of the physical universe be experimentally verified?)

Classical science, therefore, doesn’t assert or include causal closure. The laws, furthermore, describe how things go when the universe *is* causally closed, subject to no outside causal influence. They don’t purport to tell us how things *always* go; they tell us, instead, how things go when no agency outside the universe acts (beyond creation and conservation) in (or on) the universe. They tell us how things go when the universe (apart from conservation) is causally closed. The late John Mackie (himself no friend of theism) put it like this:

What we want to do here is to contrast the order of nature with a possible divine or supernatural intervention. The laws of nature, we must say, describe the ways in which the world—including, of course, human beings—works when left to itself, when not interfered with. A miracle occurs when the world is not left to itself, when something distinct from the natural order as a whole intrudes into it.¹⁷

If we think of the laws of nature as describing how the universe works when the universe is causally closed (when God isn’t acting specially in the world), they would be of the following form:

(LN) When the universe is causally closed (when God is not acting specially in the world), P.

For example, Newton's law of gravity would go as follows:

(G) When the universe is causally closed, any two material objects attract each other with a force proportional to the product of their masses and inversely proportional to the square of the distance between them.

Mackie's suggestion seems a good description of the laws of nature, and certainly fits nicely with the Newtonian picture. And, so thought of, the natural laws offer no threat to special divine action, including miracles. Miracles are often thought to be problematic, in that God, if he were to do a miracle, would be involved in "breaking", going contrary to, abrogating, suspending, a natural law. But given this conception of law, if God were to perform a miracle, it wouldn't at all involve contravening a natural law. That is because, obviously, any occasion on which God does a miracle is an occasion when the universe is not causally closed; and the laws say nothing about what happens when the universe is not causally closed. Indeed, on this conception it isn't even possible that God break a law of nature.¹⁸ For to break a law, he would have to act specially in the world; yet any time at which he acted specially in the world would be a time at which the universe is not causally closed; hence no law applies to the circumstance in question and hence no law gets broken.

The Laplacean picture

The Newtonian picture isn't sufficient for anti-interventionism or hands-off theology; so what is it that guides the thought of these hands-off theologians? The Laplacean picture. Here the classic statement, naturally enough, is by Pierre Laplace (who notoriously didn't need Newton's hypothesis of divine intervention correcting the courses of the planets). More important in the present context, Laplace also claimed that

We ought then to regard the present state of the universe as the effect of its previous state and as the cause of the one which is to follow. Given for one instant a mind which could comprehend all the forces by which nature is animated and the respective situation of the beings that compose it—a mind sufficiently vast to subject these data to analysis—it would embrace in the same formula the movements of the greatest bodies of the universe and those of the lightest atom; for it, nothing would be uncertain and the future, as the past, would be present to its eyes.¹⁹

Note that Laplace's great mind would have to have quite remarkable powers of computation: the classical three-body problem—the problem of giving an analytical solution for the equations of motion for three bodies—has not so far been solved, let alone the classical n-body problem for large n. Note also that this demon (as she has come to be called) would have to know the initial conditions with enormous—indeed, perfect—accuracy:

[I]n a game of billiards suppose that, after the first shot, the balls are sent in a continuous series of collisions, that there are a very large number of balls, and the

collisions occur with a negligible loss of energy. If the average distance between the balls is ten times their radius, then it can be shown that an error of one in the 1000th decimal place in the angle of the first impact means that all predictability is lost after 1000 collisions.²⁰

What, exactly, is needed to get from the Newtonian picture to the Laplacean picture? What has to be added? *The causal closure of the physical universe*, obviously enough. Although this addition is not at all implied by the physics (it’s a philosophical or theological add-on), it was and is widely accepted, and indeed so widely accepted that it is often not so much as noticed or mentioned in contexts where it is crucial.²¹ That the universe is indeed closed, once more, is not testified to by classical science nor a consequence of it. In touting the prowess of his calculating demon, Laplace was just *assuming* that God couldn’t or wouldn’t act specially.²² He wasn’t getting this idea out of the physics, even though it has been widely accepted and often thought to be somehow enforced by classical science. And it is this Laplacean picture that guides the thought of the hands-off theologians. If it is true, as Gilkey suggests, that these theologians, like Martin Luther, really can’t do otherwise, then it is the Laplacean picture that has them so firmly in its grip.

And it is the Laplacean picture—the laws of classical science plus the causal closure of the physical universe—that leaves no room for divine action in the world. The Laplacean demon knows that the universe is causally closed; so she knows, for each of the natural laws, that its consequent is true. But given the consequents of the laws and the state of the universe at any one time, the state of the universe at any other time is a necessary consequence. Hence, given the laws God originally sets for the universe together with causal closure and the state of the universe at any one time, she can simply deduce the state of the universe at any other time. And of course this would leave no room for special divine action, that is, action beyond creation and conservation. If God ever acted specially, in the world, that great intellect would not be able to make those calculations. If God acted specially in the world, there would be a time t such that what happens at t doesn’t follow from the consequents of the laws together with what happens at any other time; hence, if Laplace’s demon tried to calculate what happens at t by using the laws and what happens at some other time t^* , she would get the wrong answer. (Of course it also follows directly from causal closure alone that God doesn’t act specially in the world.)

This picture (thought of as a proposition) does not entail that God *cannot* act specially in the world; even if the physical universe is causally closed, it isn’t a necessary truth that it is, and presumably God, being omnipotent, could act specially in it if he saw fit. What the picture entails is only that as a matter of fact he *does not* act specially therein. But this picture also has an implication for human freedom. For if the universe is causally closed, the consequents of the laws together with $S(t)$ (where t is, let’s say, a million years ago and $S(t)$ is the state of the universe at t) entail the current state of the universe, $S(\text{just now})$. So suppose $S(\text{just now})$ includes my going to the kitchen for a drink. If so, and if the Laplacean picture is correct, it was not within my power to refrain from getting a drink then. For it would have been within my power to refrain from going to the kitchen then only if it had been within my power, then, to perform some action A (where

refraining counts as an action) such that if I had performed A , then either the consequents of the natural laws would have been different from what in fact they are, or $S(t)$ would have been different from what *it* was, or the physical universe would not have been causally closed. It would have been within my power to avoid that action only if either the laws or the state of the universe a million years ago or the causal closure of the universe were within my power, in the sense that I could have done something such that if I had done that thing, then either the physical universe would not have been causally closed, or else either the laws or that state of the universe then would have been different from what in fact they are. It is plausible to think that none of these things is within my power.²³ Therefore it is plausible to think that my action of going to the kitchen for a drink was not a free action.²⁴ Hence the Laplacean picture plausibly implies that no human actions are free.²⁵

It's worth noting that the same definitely does not go for the Newtonian picture. Just as the Newtonian picture leaves room for divine action in the world, so it also leaves room for human free action. The Newtonian picture does not imply that the material universe is causally closed; but if it is *not* causally closed, if it is possible that beings outside that universe (immaterial beings) cause events within it, then it is possible that God acts specially in the world. Note that under those conditions, it is also possible, in the broadly logical sense, that human beings, thought of dualistically, act freely in the world. For suppose (as Plato, Augustine, and Descartes and some contemporaries²⁶ hold), that human beings resemble God in being immaterial selves or substances. Then, just as God, who is an immaterial being, can act in the hard, heavy, massy physical universe, so too, perhaps, can human beings; God could confer on them the power to cause changes in the physical universe. Perhaps my willing to move my arm causes neurological events in my brain, which in turn cause or part-cause my arm to move. Classical physics and the Newtonian picture, therefore, unlike the Laplacean picture, do not imply either that human beings cannot act freely or that God does not act specially in the world.

Determinism and the Laplacean picture

It is natural to think of the Laplacean picture as *deterministic*. Is this correct? That depends upon what, precisely, determinism is. What is it? The currently canonical account of determinism goes as follows: the natural laws together with the state of the universe at any one time entail the state of the universe at any other time. A bit more exactly: let " L " be the conjunction of the natural laws, and $S(t)$ and $S(t^*)$ be the states of the universe²⁷ at any times t and t^* : then,

Necessarily, for any t and t^* , if $L \& S(t)$, then $S(t^*)$.

(If we wish to accommodate the intuition that it is the past that determines the future, we may add, "such that t precedes t^* ".) It is worth noting that if the above account of natural law is correct, determinism so understood is false and indeed

necessarily false. For suppose determinism is true. According to the above account, a natural law is of the form:

If the universe (call it "U") is causally closed, P.

Take the conjunction of the natural laws to be

If U is causally closed, then P

where now P is the conjunction of the consequents of all the laws. Let "PAST" denote a specific past state of the universe. Now, suppose determinism is true. Then:

(1) (If U is causally closed, then P) and PAST

entails

F (the future (the actual future)),

i.e. (using "N" to mean "Necessarily"),

(2) N (if (1) then F).

(2) is equivalent to

(3) N [if (if the U is causally closed then P) and PAST, then F],

i.e.,

(4) N [if (either U is not causally closed or P) and PAST, then F]

i.e.,

(5) N {if [(PAST and P) or (PAST and U is not causally closed)] then F}.

(5) is of the form

N if (p or q) then r;

but then each of p and q entail r; hence

(6) N[if (PAST and P) then F] and N[if (PAST and U is not causally closed) then F].

But the right-hand conjunct of (6) is obviously false: clearly there is a possible world that (1) shares its past with the actual world, (2) is not causally closed (because, perhaps, God acts specially in it) and (3) does not share its future with the actual world. Therefore determinism, which entails (6), is false. Indeed, (given

the usual view that propositions of the form *Necessarily p* are non-contingent, either necessarily true or necessarily false, (6) is necessarily false; hence determinism, which entails it, is also necessarily false.

Determinism so thought of is necessarily false; but the Laplacean picture (classical physics plus closure) clearly doesn't entail it. (This is clear just because Laplaceanism is clearly possible.) There is something in the neighborhood that it does entail, however. Consider the conjunction of the consequents of all the laws and call it "L": Laplaceanism entails that L and PAST entail the future. To put it another way: suppose we take it that the laws of nature—Newton's laws, for example—don't have the form that Mackie (and I) think they have, but consist simply in the consequents of the laws as Mackie thinks of them. Then the Laplacean picture does entail determinism, taken as the view that the past and the laws of nature entail the future. But the main point is that classical science doesn't entail either determinism or that the universe is in fact causally closed. It is therefore entirely consistent with special divine action in the world, including miracles.

There is an interesting irony, here, in the fact that the hands-off theologians, in their determination to give modern science its due, urge an understanding of classical science that goes well beyond what classical science actually propounds. Hands-off theologians can't properly point to science—not even to eighteenth- and nineteenth-century classical science—as a reason for their opposition to divine intervention. What actually guides their thought is not classical science as such, but classical science plus a metaphysical add-on—an add-on that has no scientific credentials and goes contrary to classical Christianity.

The new picture

Hands-off theologians, as we have seen, think of themselves as expressing allegiance to science. More conservative theologians sometimes were and sometimes are dismissive of science, or indifferent to it, or even hostile to it; not so for these theologians. The hands-off theology they endorse, however, is not a consequence of the classical science they admire; the Laplacean picture they urge on us is in no way implied by the classical science to which they so solemnly pledge fealty. There is a further irony: the classical science they so eagerly meant to accommodate was well out of date at the time they were accommodating it. As we all know, the old Laplacean (and Newtonian) scientific picture has been superseded by virtue of two large-scale, indeed, stunning scientific revolutions—revolutions that have been with us for more than three quarters of a century. First, there is relativity theory, both special and general. Second, and crucial for our purposes, there is quantum mechanics.

*Quantum mechanics*²⁸

This is not the place to outline the essentials of quantum mechanics, even if that were within my powers; let me just recommend "Distilling Metaphysics from

Quantum Physics” by Tim Maudlin.²⁹ Still, a few remarks about it are essential to the current project. QM is characterized by several substantial departures from classical physics; of these, only *indeterminism* is relevant to our present concerns. Classical mechanics is deterministic in the following sense. Suppose you are given an initial configuration of a material system—that is, a system of particles together with their positions, masses and velocities—at a time t , and now consider any time t^* future with respect to t . If the system is causally closed, there is just one outcome consistent with classical mechanics. It may be impossible to calculate the outcome—indeed, as mentioned above, we don’t have analytic solutions for the “ n body problem” where $n > 2$; nevertheless, for any t^* only one outcome is permitted by classical mechanics.

Things are very different for QM. The Schrödinger equation for a system S —a system of particles, for example—associates a wave function with S ; in essence, for any future time t , the wave function assigns a complex number to the many configurations possible for S at t —possible in the sense that they are permitted by the Schrödinger equation. This wave function is used (via “Born’s rule”) to assign a certain probability to each possible configuration c for S at t ; the probability of finding S in c at t . The point, here, is that (unlike in classical mechanics) we don’t get a prediction of a unique configuration for the system at t , but only a distribution of probabilities across many possible outcomes. Given a quantum mechanical system, therefore, QM doesn’t say which configuration will *in fact* result from the initial conditions; instead, it assigns a spectrum of probabilities to the possible outcomes. If our system consists in a single particle, for example, QM doesn’t tell us where that particle will be found at a subsequent time t^* , but (via Born’s rule) only gives us probabilities for its location then.³⁰

QM as such, therefore, does not support the Laplacean picture: many different positions for that particle at t^* are consistent with the laws together with its position at t ; for a system of particles, many different configurations at t^* are consistent with the laws together with its configuration at t . Hence not even someone as talented as that demon can predict the physical condition of the universe at future times, even if she is given the laws along with a completely determinate description of the universe at present. It is this indeterminism that has led people to say that, according to QM, it is possible (however unlikely) that all the particles in my body (and hence my body itself) be on one side of a wall at t , and at t^* as close as you please to t , these particles (and hence my body) be on the other side of that wall. In the same vein (so it is sometimes said), QM permits the equestrian statue of Robert E. Lee in Richmond, Virginia, to leap from its pedestal and gallop off into the distance, waving its hat and bellowing a rebel yell.

Now, we saw earlier that the classical laws of mechanics and conservation of energy should be thought of with an implicit proviso: they apply *when the relevant system (the universe, for example) is causally closed*. The same proviso holds, substantially, in the case of QM: the laws apply to causally closed systems. But even apart from this proviso, special divine action, including miracles, is by no means clearly incompatible with QM. That is because (again) it doesn’t determine a specific outcome for a given set of initial conditions, but instead merely assigns probabilities to the possible outcomes. This means that, even apart from that

proviso, the laws don't constrain special divine action in anything like the way they do on classical deterministic mechanics.

Clearly they don't prohibit divine providential action and answers to prayer; what about such stunning miracles as walking on water, rising from the dead, changing water into wine, parting the Red Sea, miraculous healings, and so on? Here, since I am not a quantum mechanic, I am reduced to arguing from authority. According to the expert opinion to which I have had access, some of these (parting the Red Sea, miraculous healings) are pretty unproblematically compatible with QM. On others, however—for example, raising someone from the dead, and transmutation, as with changing water into wine—there seems to be substantial difference of opinion among the experts. Little analysis of these kinds of cases has been published; but some of the experts I've talked with (Katherine Brading, Craig Lent, Bas van Fraassen) think it implausible that QM be compatible with these miracles. Others, for example John Earman and Bradley Monton, think QM is compatible with them. Thus Earman:

If we try to define a miracle as an event that is incompatible with (what we presume, on the basis of the best evidence, to be) laws of nature, then it seems that water changing to wine, a dead man coming back to life, etc. are not miracles because they are not incompatible with QM. But QM does say that they are very, very improbable. If we try to redefine a miracle as an event whose lawlike probability is very, very low, then too many things will count as miracles ... (Personal communication with author, August 9, 2007)

And according to Monton,

For what it's worth, I think that all the miracles are pretty unproblematically compatible with the GRW theory. The wave function for each particle is spread throughout an unbounded region of the universe, at every time (except perhaps momentary instants of time). This means that for each particle, there is at most a finite region where it couldn't be localized by a GRW hit. (For some (probably even most) particles, they could be localized anywhere.) So for changing water into wine, it's not a big deal—you've got a bunch of individual particles (electrons, protons, etc.) that are composing the water, and they can all have GRW hits such that their positions are redistributed to the locations that would be appropriate for them to compose wine. Since there's at most a finite region of the universe where these particles can't show up, and there no reason to expect the finite regions for the different particles to overlap in any special way, the particles can all appear in the positions appropriate for them to compose wine. (Personal communication with author, August 8, 2007)

Monton is speaking of GRW quantum mechanics (see below); presumably a similar point would apply to the classical Copenhagen interpretation. So the first thing to see here is that it is far from clear that QM, even bracketing the proviso according to which the laws apply to closed systems, is incompatible with the Biblical and other miracles. And if what happens in the physical world at the macroscopic level supervenes on or is determined by what happens at the microlevel—the quantum level—then if miracles are compatible with the laws of quantum mechanics, they will also be compatible with any macroscopic laws.

On the New Picture, therefore—the picture presented by QM—there is no question of special divine action’s being consistent with science; and even the most stunning miracles are not clearly inconsistent with the laws promulgated by science. One might therefore expect that the whole concern about special divine action would disappear. If one did, one would be disappointed; the fact is many philosophers, theologians and scientists—thinkers who are wholly aware of the QM revolution—still apparently find a problem with miracles and special divine action generally. Bultmann, Gilkey, Macquarrie and their friends reject divine intervention in the name of an eighteenth-century picture of science; many contemporary writers in this field also reject divine intervention—not, now, by appealing to an outmoded picture of science, but for other more obscure reasons. I shall argue two points: first, that their reasons for rejecting intervention are no sounder than those of Gilkey and others. And second, I’ll argue that, given contemporary quantum physics, there isn’t any sensible way to say what intervention *is*, let alone find something in science with which it is incompatible.

What is the problem with “intervention”?

First, however, we need a representative sample of contemporary thinkers in this area who reject intervention. An excellent exhibit is “The Divine Action Project,”³¹ a 15-year series of conferences and publications that began in 1988. So far, these conferences have resulted in five or six books of essays involving some 50 or more authors—scientists, theologians, philosophers—including many of the most prominent writers in the field: Ian Barbour, John Polkinghorne, Arthur Peacocke, Robert Russell, Thomas Tracy, Nancey Murphy, Philip Clayton, and many others. This is certainly a serious and most impressive attempt to come to grips with the topic of divine action in the world. Nearly all of these authors believe that a satisfactory account of God’s action in the world would have to be *non-interventionistic* (and to begin with, let’s suppose we have a good idea as to what intervention is). It would be fair to say, I think, that the main problem for the Project is to find an account of divine action in the world—action beyond creation and conservation—that doesn’t involve God’s intervening in the world. Thus the late Arthur Peacocke, one of the most prominent members of this project, comments as follows on a certain proposal for divine action, a proposal according to which God’s special action would be undetectable:

God would then be conceived as acting, as it were, “within” the flexibility we find in these (to us) unpredictable situations in a way that could never be detected by us. Such a mode of divine action would never be inconsistent with our scientific knowledge of the situation ... God would have to be conceived of as actually manipulating micro-events (at the atomic, molecular, and according to some, quantum levels) in these initiating fluctuations on the natural world in order to produce the results at the macroscopic level which God wills.

But such a conception of God’s action ... would then be no different in principle from that of God *intervening* in the order of nature with all the problems that that evokes for a rationally coherent belief in God as the creator of that order. The only difference ... would be that ... God’s intervention would always be hidden from us.³²

What are the problems evoked “for a rationally coherent belief in God as the creator of that order”; why should we expect God to avoid intervention? Philip Clayton, one of the authors in this group, puts it as follows: “the real problem here, apparently, is that it is very difficult to come up with an idea of divine action in the world in which such action would not constitute ‘breaking natural law’ or ‘breaking physical law’”.³³ But can this be right? As we’ve seen, it is extremely hard to “break” quantum mechanical laws—even with the “when the universe is causally closed” preface deleted. And in any event, the whole notion of “breaking” a natural law seems confused, as I have argued above. Wildman proposes a more promising problem for intervention:

The DAP project [sic] tried to be sensitive to issues of theological consistency. For example, the idea of God sustaining nature and its law-like regularities with one hand while miraculously intervening, abrogating or ignoring those regularities with the other hand struck most members as dangerously close to outright contradiction. Most participants certainly felt that God would not create an orderly world in which it was impossible for the creator to act without violating the created structures of order.³⁴

According to George Ellis, another prominent member of this group,

Nevertheless it seems probable that fixed laws of behavior of matter, independent of interference by a Creator or any other agency, is a requisite basis of existence of independent beings able to exercise free will, for they make possible meaningful complex organized activity without outside interference (physical laws providing a determinate frame within which definite local causal relations are possible). Thus we envisage the Creator choosing such a framework for the universe (thus giving up all the other possibilities allowed by the power available to him, such as the power to directly intervene in events by overruling the laws of physics from time to time).³⁵

Elsewhere, Ellis goes on:

The problem of allowing miraculous intervention, to turn water into wine, to heal the sick, to raise the dead . . . is that this involves either a suspension or alteration of the natural order. Thus the question arises as to why this happens so seldom. If this is allowed at all to achieve some good, why is it not allowed all the time, to assuage my toothache as well as the evils of Auschwitz?³⁶

He adds that what we need, in order to understand divine action of this sort, is a criterion:

What one would like here—if one is to make sense of the idea of miracles—is some kind of rock-solid criterion of choice underlying such decisions to act in a miraculous manner, for if there is the necessity to hold to these laws during times of the persecutions and Hitler’s Final Solution, during famines and floods, in order that morality be possible, then how can it be that sometimes this iron necessity can fade away and allow turning water to wine or the raising of Lazarus?³⁷

Finally, Nicholas Saunders explains why Philip Hefner, another member of the group, objects to intervention: “he feels it challenges the concepts of divine faithfulness and self-consistency: how can God uphold the laws of nature with

one hand, whilst simultaneously overriding them by performing miracles with the other?"³⁸

So how shall we understand these objections to intervention? What exactly (or even approximately) is the problem? I'm not quite sure, but the authors quoted seem to see essentially three problems; I'll say just a bit about each. First, there is that connection with the problem of evil noted by Ellis: "The problem of allowing miraculous intervention," he says, is that if God intervenes some of the time, e.g., raising Jesus from the dead, parting the Red Sea, why doesn't he intervene more often, "to assuage my toothache as well as the evils of Auschwitz?"³⁹ I begin with a small protest: Ellis speaks of the "problem of allowing miraculous intervention." But of course that isn't actually a problem for us (or anyone else); it isn't up to us whether or not to allow miraculous intervention. God will intervene if and when he sees fit.

What Ellis means, of course, is that we can't *sensibly suppose* that God intervenes unless we have "some kind of rock-solid criterion of choice underlying such decisions to act in a miraculous manner"—i.e., unless we have a rock-solid criterion saying when God would intervene and when he wouldn't. Surely that's asking far too much? God will intervene (if that's the right word) when he has a good reason for doing so; but why suppose we human beings would be in a position to know when he does and when he doesn't have a good reason? Perhaps we are in a position like Job's: what happened to him was a result of mysterious transactions among beings some of whom were wholly unknown to him. Couldn't something similar hold for us? True; perhaps I can't say what God's reason is for intervening (if that is the right word) in raising Lazarus from the dead and not intervening in Auschwitz; but why should that incline me to think he never intervenes at all? It's not as though, if he has such a reason, I'd be the first to know. His options and possibilities are far beyond our ken; his ways are "past finding out";⁴⁰ we can hardly expect to come up with a "rock-solid criterion" underlying his decisions to act.⁴¹

Second, Ellis suggests that "fixed laws of behavior of matter, independent of interference by a Creator or any other agency, is a requisite basis of existence of independent beings able to exercise free will." The idea seems to be that if the creator "interfered" in the workings of the world, we couldn't exercise free will.⁴² Again, first a protest. "Interfering"⁴³ is clearly pejorative: one who interferes, meddles in something where he has no business, and should therefore be ashamed of himself. But God is the creator and sustainer of the world; it's really his world. So how could he be "interfering" or "meddling" in acting in it? What Ellis means, I take it, is that if God (often?) intervened in our world, we wouldn't be able to make sensible decisions as to what to do. Is this right? First, what's at issue with respect to the possibility of free action isn't really the absence of divine intervention, it is rather *regularity* and *predictability*. (Predictability by the free creatures in question.) Free action would not be possible in a world without regularity and predictability, even if God never intervened in it; free action *would* be possible in a world in which God often intervened, provided he did so in a regular and predictable way. Suppose, for example, that God always performed a miraculous healing whenever a witch doctor did a certain dance: this would enhance rather than compromise free action.

For purposes of argument, however, let's temporarily assume that divine intervention always introduces irregularity. Isn't it still much too strong to suppose that if God sometimes intervenes in the world, intelligent free action just wouldn't be possible? What's required for free action is that there be enough regularity for us to know or sensibly conjecture, at least for the most part and with reasonably high probability, what will happen if we freely choose to take a given action. Ric is rock climbing; he's halfway up a vertical 150-foot face, 10 feet above his last protection, and it looks as if it's another 10 feet to the next protection point; so if he fell just before reaching that point, he'd fall at least 40 feet before the rope stopped him. (More, because of slack in the system, rope stretch, possible inattention on the part of his belayer, etc.) To decide whether to carry on or retreat, he has to be able to form a decent opinion as to how likely it is that he will fall there, and on what will happen if he does fall there: will he hit a ledge on the way down? Will his top protection pull out, so that he'll fall still farther? If he has no answer at all to these questions, he can't make a sensible decision as to whether to back off.

For him to be able to make a sensible decision, however, it isn't required that God never intervene in the workings of the world. Suppose Ric thinks someone has been miraculously healed or even raised from the dead: that obviously doesn't mean that he can't make a sensible decision here. More to the point, suppose he thinks God sometimes intervenes in situations like the one he is in, perhaps causing a piece of protection to hold that would otherwise have failed: again, his so thinking in no way means that he can't make a sensible decision. Here Ric is acting under uncertainty, and the best he can do is make an educated guess: but even in cases where we are very sure what will happen, sensible free action does not require that God never intervene. Ric gets to the top of the climb; the fastest way down would be to jump; he's not tempted, though, because he knows that a 150-foot fall would very likely kill or injure him. Now suppose he also believes that God occasionally intervenes, causing someone who takes such a fall to survive unhurt; that still won't tempt him to jump. All that's required for free action is reasonable confidence in substantial regularity in the neighborhood of the proposed action. And that's certainly compatible with God's sometimes intervening.⁴⁴

The third objection—what we might call “the divine consistency objection”—is apparently the one most widely urged by the members of the Divine Action Project. Paul Tillich (himself no member of the DAP) puts it in engaging if Delphic form: “Miracles cannot be interpreted in terms of supernatural interference in natural processes. If such an interpretation were true, the manifestation of the ground of being would destroy the structure of being; God would be split within himself.”⁴⁵ Wildman, as we saw above, speaks of “theological consistency” and “coming dangerously close to outright contradiction” in this connection; Peacocke suggests that God's intervening in the order of nature creates problems for a rationally coherent belief in God as the creator of that order; according to Nicholas Saunders, Philip Hefner objects to intervention because he believes that it “challenges the concepts of divine faithfulness and self-consistency”; several of the members of DAP concur in the question “how can God uphold the laws of nature

with one hand, whilst simultaneously overriding them by performing miracles with the other?"⁴⁶

Now the members of the DAP, unlike Bultmann, Gilkey, and others, are of course perfectly aware of the quantum revolution, perfectly well aware of the way in which quantum science has undermined Laplacean determinism. Nevertheless, they still seem to display a list in the Laplacean direction: Clayton speaks of God's "breaking" natural laws, and Saunders, just quoted, speaks of "overriding" the laws of nature by performing miracles. But, as I argued above, it's exceedingly difficult to see how God could override or "break" natural laws by miraculous healings or raising someone from the dead; and under the new picture, it's doubtful that these things are precluded by quantum mechanical laws, even without the proviso according to which these laws apply only to closed systems.

How, then, are we to understand this consistency problem? The picture seems to be that of God's establishing a world with certain regularities, and then occasionally acting contrary to those regularities. He creates and governs the world in such a way that water ordinarily doesn't change into wine, people don't ordinarily walk on water, and dead people ordinarily don't come back to life. Indeed, this hardly ever happens. But then, very occasionally, God acts in a way that goes contrary to those regularities: Jesus turns water into wine, walks on water, raises Lazarus from the dead and is himself raised from the dead on the third day. And this is thought to raise an issue of *consistency*: God doesn't always act in the relevantly same way: he doesn't always treat the stuff he has made in the same way.

Here the objection, of course, is theological, and has nothing to do with science. The idea is that God simply wouldn't do such a thing; this sort of action is inconsistent with his unfathomable augustness and unsurpassable greatness. As Ernan McMullin puts it,

The Creator whose powers are gradually revealed in these texts [Genesis, Job, Isaiah, Psalms] is omnipotent and all-wise, far beyond the reach of human reckoning. His Providence extends to all His creatures; they are all part of His single plan, only a fragment of which we know, and that darkly. Would such a being be likely to "intervene" in the cosmic process, that is, deal in two different manners with it?⁴⁷

Intervening, so the claim goes, would reveal that God falls into inconsistency—not the sort of inconsistency involved in asserting inconsistent propositions, but the kind involved in, for example, sometimes treating one of your spouse's peccadilloes with patience and good humor and other times under relevantly similar circumstances responding with tight-lipped annoyance. The problem, here, would be something like caprice or arbitrariness; there is something arbitrary and whimsical in "dealing in two different manners" with the cosmic process.

This of course is a very large subject; obviously I don't have the space to treat it with the care it deserves. Still, what exactly is wrong with the idea that God should intervene (again, supposing we knew what intervention is)? The suggestion is that God would display a sort of arbitrary inconsistency if he

sometimes acted contrary to the regularities he has established for his world. But is this really true? There would be arbitrariness and inconsistency only if there were no special reason for taking action contrary to the usual regularities; but of course God might very well have such reasons. This is obvious for the case of raising Jesus from the dead. In other cases too, however, he might have reasons for “dealing in two different manners” with his cosmos; how could we be even reasonably sure that he doesn’t? Perhaps he aims to establish basic regularities (thus making science and free intelligent action possible for his creatures), but also has good reason (for example, to mark special occasions, or to make clear his love or his power, or to authorize what someone says, to guide history in a certain direction) for sometimes acting contrary to those regularities. Why should any of this be in any way incompatible with his unsurpassable greatness?

Many seem to think of God as like a classical artist, one who prizes economy, restraint, discipline. But perhaps God is more like a romantic artist; perhaps he revels in glorious variety, riotous creativity, overflowing fecundity, uproarious activity. Why else would he create a million species of beetles? Perhaps he is also very much a hands-on God, entering history regularly and often, time and time again, in order to lead, guide, persuade and redeem his people, bless them with the “Internal Witness of the Holy Spirit” (Calvin) or “The Internal Instigation of the Holy Spirit” (Aquinas)⁴⁸ and confer upon them the gift of faith. None of this so much as begins to compromise his greatness and majesty, his august and unsurpassable character.

What is intervention?

The reasons for supposing God couldn’t or wouldn’t intervene in his creation are weak. But now we must face a more poignant question: What, from the point of view of the new picture, *is* intervention? Can we so much as say what it consists in?

We can say what it is on the old picture, at least approximately. Of course, we can’t characterize an intervention as an action that causes an event (E) that is contrary to a natural law. That is because, as you will recall, the form of a natural law is:

(NL) When the universe is causally closed (when God is not acting specially in the world), P;

but if and when God intervenes, the universe is not then causally closed, so that the antecedent of the proposed law is not satisfied.⁴⁹ Nor can we say that an intervention is a divine act producing an event that would not have occurred but for that act: any act of conservation meets that condition, and conservation is not a case of intervention.

Suppose we look in a different direction. Returning to (NL), delete the antecedents from all the laws, conjoin the resulting propositions, and use “L” as the name for that conjunction. On the deterministic Laplacean picture, as we’ve seen, $S(t)$, the physical state of the universe at any time t , conjoined with L, entails

$S(t^*)$ for any (later) time t^* . Let’s make a couple of simplifying assumptions; suppose the material universe has a beginning at a time t_0 , suppose it evolves according to L , suppose no intervention occurs at t_0 ,⁵⁰ suppose no two interventions occur at exactly the same time, and suppose there are at most countably many interventions. Then an intervention will have occurred at the first time t^* such that

$$S(t_0) \& L$$

does not entail

$$S(t^*).$$

More generally, we can let t be just any time, not just that hypothetical first moment; let t^* be the first time after t such that $S(t^*)$ is not entailed by $S(t) \& L$: an intervention will have occurred at t^* .⁵¹

Of course, this still doesn’t tell us what an intervention *is*. As an effort in that direction, we might try saying that an intervention is an action (divine, demonic, angelic, human) that causes an event E to occur at a time t , such that for some t^* prior to t , $S(t^*) \& L$ doesn’t entail that E occurs at t . The idea is that God, for example, causes an event E to occur at t , such that at some earlier time t^* , Laplace’s demon could not have predicted that E would occur at t (even if she knew both L and the total physical state $S(t^*)$). Sadly enough, however, this won’t quite do the trick. For suppose God intervenes in this sense at t : say he creates a full-grown horse *ex nihilo*, so that E is the coming-to-be of this horse. Let t^* be an earlier time such that $S(t^*)$ doesn’t entail that E occurs at t . Now consider some time t^{**} later than t and suppose God performs a non-interventionist act of preserving or sustaining that horse at t^{**} . This act causes an event E^* consisting in the horse’s existing at t^{**} ; $L \& S(t^*)$ clearly doesn’t entail that E^* occurs. So on our definition, this act of sustaining counts as an intervention. But it shouldn’t.

We might try the following: stipulate that where E results from an intervention at t , for every earlier time t^* , $S(t^*) \& L$ does not entail that E occurs at t . The definition thus goes as follows:

(INT) An act A (divine, demonic, angelic, human) is an intervention just if A causes an event E to occur at a time t , where there is an interval of times bounded above by t such that for every time t^* in that interval, $S(t^*) \& L$ doesn’t entail that E occurs at t .

(INT) tells us how to think of intervention given the old picture; but how shall we think of it on the new? The aim of most of the DAP members, apparently, is to come up with an account of special divine action—action beyond creation and conservation—that doesn’t entail or involve intervention. Several of the DAP authors apparently hold that intervention involves “violating the laws”⁵² “setting aside natural law,”⁵³ or “overriding”⁵⁴ those laws; but how could God set aside or override the probabilistic laws of quantum mechanics in performing those miraculous acts? What would intervention be, in the context of QM? Clearly, (INT) won’t work in the QM context. We can see this as follows. Suppose, once

more, we delete the antecedents of the laws, conjoin the resulting propositions, and call that conjunction “L”: according to quantum mechanical indeterminacy, $S(t) \& L$, for a given time t , will not (except under extremely unusual conditions) entail $S(t^*)$ for other times t^* . Hence (INT) as it stands will count every divine act of conservation as an intervention—which means, of course, that it won’t do. Given the indeterminism of quantum mechanics, nothing like (INT) is available. So what would an intervention be? (INT) won’t work for the new picture, but what else can we come up with?

A fairly common thought—perhaps more like a sort of assumption than an actual proposal as to the nature of intervention—is that an intervention occurs when God performs an action, the consequence of which is an event that would not have occurred had God not performed that action:

- (1) God intervenes if and only if he performs an action A , thereby causing a state of affairs that would not have occurred if God had not performed A .

But obviously this as it stands can’t be right: in any act of conservation, God causes a state of affairs that would not have occurred had he not performed that act. If God conserves you in existence, your continuing to exist is a state of affairs that would not have occurred (been actual) if he had not performed that action. But conservation is not intervention.

Another possibility, therefore, would be:

- (2) God intervenes if and only if he performs an action A thereby causing an event E that (a) goes beyond conservation and creation, and (b) is such that if he had not performed A , E would not have occurred.

But this also won’t work for those intent on finding a conception of special divine action that doesn’t involve intervention. For what would be the difference between intervention, so construed, and special divine action? The project is to find a conception of special divine action—divine action that goes beyond conservation and creation—that doesn’t involve intervention; but if (2) is true, every case of special divine action will automatically be a case of intervention—in which case the whole project of trying to find a conception of special divine action that doesn’t involve intervention looks a little unlikely.

So what *is* divine intervention? Wildman speaks more vaguely of “violating the created structure of order”:

Most participants certainly felt that God would not create an orderly world in which it was impossible for the creator to act without violating the created structures of order . . . A noninterventionist special divine act is in accord with created structures of order and regularity within nature, while an interventionist special divine act involves abrogating, suspending, or ignoring created structures of order and regularity within nature.⁵⁵

William Stoeger adds that he believes that all the DAP participants agree with this definition.⁵⁶ But what are these created structures of order and regularity?

Presumably they aren't the natural laws as disclosed in QM—once again, God's performing a miracle wouldn't violate them. So what *are* they?

Here, therefore, is the problem. As we have seen, many, perhaps most of the members of the DAP object to the thought that God, in acting specially in the world, *intervenes* in the world; we have canvassed some of their objections. Therefore they seek an account of special divine action that does not involve divine intervention. But it is difficult or impossible to see what they think intervention *is*. Hence it is difficult or impossible to see what it is to which these writers object. If the aim is to find an account of special divine action that is not interventionistic, perhaps the first order of business ought to be to say what it is they find objectionable—what an interventionistic account, as they see it, would be like, what condition would be necessary and sufficient for a divine action to constitute an intervention.

Intervention and divine action at the quantum level

But perhaps there is a way around this problem. Perhaps they can't say what intervention is; even so, it may be possible to specify a way God can act specially in the world that avoids the objections brought against intervention. The chief objection, the heart of the matter, I think, is twofold. First, there is that concern with intervention as somehow going against the natures of the things God has created. And second, there is that alleged “inconsistency”: as McMullin puts it with admirable succinctness, for God to intervene is for him to “deal in two different manners” with the cosmos he has created. The idea is that for the most part, God does nothing special; he just conserves the world and allows it to develop or evolve according to the laws he has set for it, or he permits it to develop in accord with the natures of the entities it contains, or he treats the stuff he has made in the same way. Once in a while, however, he steps in and does something special; and it is that contrast between his ordinary dealings with the world, and the way in which he deals with it on special occasions, that is the cause for complaint.

Now, as I've argued, neither of these objections is at all clear or obviously accurate. Furthermore, it isn't easy to see what is problematic about God treating what he has made differently on different occasions: might he not have a good reason for doing so? But perhaps there is a way in which God can act specially in the world, and do so in a manner that accommodates those concerns. Then, even if we don't know what intervention is, we could still specify a mode of divine action that isn't subject to those objections. Perhaps we can't say whether or not that mode of action is interventionistic; but we can still see that it isn't subject to the objections brought against intervention, whatever exactly intervention is. Fifty years ago, William Pollard suggested that God *acts at the quantum level*;⁵⁷ several members of the DAP have taken up, examined and developed his suggestion.⁵⁸ All of these authors focus on the conventional Copenhagen interpretation. God can cause quantum events, and, because the laws are merely statistical, do so without “suspending” those laws.

This action on his part can perhaps be amplified—by chaotic effects or in other ways—to the macroscopic level; in this way, God can perhaps cause dramatic effects at the level of everyday life, and perhaps do so without falling into intervention.

John Polkinghorne notes a problem with this suggestion. First, the above authors speak of quantum *events*. Now on the Copenhagen interpretation, the only events for which indeterminism holds are those mysterious *measurements*. But then, says Polkinghorne,

There is a particular difficulty in using quantum indeterminacy to describe divine action. Conventional quantum theory contains much continuity and determinism in addition to its well-known discontinuities and indeterminacies. The latter refer, not to all quantum behavior, but only to those particular events which qualify, by the irreversible registration of their effects in the macro-world, to be described as measurements. In between the measurements, the continuous determinism of the Schrödinger equation applies. Occasions of measurement only occur from time to time, and a God who acted through being their determinator would also only be acting from time to time. Such an episodic account of providential agency does not seem altogether satisfactory theologically.⁵⁹

Measurements are of course mysterious, and have been variously interpreted; but insofar as, on the Copenhagen interpretation, they occur thus episodically, Polkinghorne's stricture seems right.

Now the Copenhagen interpretation is of course a *collapse* interpretation; but there are other collapse approaches. For example, there are spontaneous collapse theories, including in particular, the Ghirardi–Rimini–Weber (GRW) approach.⁶⁰ On these collapse approaches, collapses are not restricted to measurements; they occur spontaneously, and at a regular rate. One of the main motivations here is to help with the location problem: on the standard Copenhagen interpretation, objects, including macroscopic objects, don't seem to have a location at times at which their location isn't being measured or detected; this can seem embarrassing. But on the GRW interpretation, "it follows that a macroscopic [system] undergoes a localization every 10^{-7} seconds."⁶¹ This still leaves puzzles: is this macroscopic system, my body, e.g., only intermittently located, even if located 10 million times a second?⁶² But at any rate there seems to be substantially less offense to common opinion, here, than on the classical interpretation.

On this approach, perhaps we could think of the *nature* of a system as dictating that collapses occur at the regular rate they in fact display. What is presently of particular significance, however, is that on these approaches there is no cause for a given collapse to go to the eigenstate to which in fact it goes. That is, there is no *physical* cause; there is nothing in the previous physical state of the world that causes a given collapse to go to the particular eigenstate to which it *does* go. But of course this state of affairs might very well have a *non-physical* cause. It's wholly in accord with these theories that, for any collapse and the eigenstate that results, it is God who causes *that* state to result. Perhaps, then, all collapse-outcomes (as we might call them) are caused by God.⁶³ If so, then between collapses, a system evolves according to the

Shrödinger equation; but when a collapse occurs, it is divine agency that causes the specific collapse-outcome that ensues. On this view of God’s special action—call it “Divine Collapse-Causation” (the hyphen to ward off an unhappy theological connotation), “DCC” for short—God is *always* acting specially, i.e., always acting in ways that go beyond creation and conservation, thus obviating the problem alleged to lie in his sometimes treating the world in hands-off fashion but other times in a hands-on way.

Furthermore, if, as one assumes, the macroscopic physical world supervenes on the microscopic, God could thus control what happens at the macroscopic level by causing the right microscopic collapse-outcomes. In this way God can exercise his providential guidance over cosmic history; he might in this way guide the course of evolutionary history by causing the right mutations to arise at the right time and preserving the forms of life that lead to the results he intends. In this way he might also guide human history. He could do this without in any way “violating” the created natures of the things he has created. For on this suggestion, it is in the nature of physical systems to evolve between collapses according to the Shrödinger equation; it also is in their nature to undergo periodic collapses; but it is not part of their nature to collapse to any particular eigenstate. Hence, in causing a nature to collapse to a particular eigenstate, God need not constrain it against its nature. From the point of view of the objections to intervention, the beauty of DCC is threefold: first, God is always and constantly engaging in special action; second, DCC shows how God can seamlessly integrate the regularity and predictability in our world necessary for free action with the occasional miraculous event; and third, it shows how all this can happen without any divine “violation” or interruption of the created order. Hence it eludes those objections to intervention.

“But isn’t it part of the very nature of such a system to collapse in such a way as not to violate the probabilities assigned by the Born Rule? And wouldn’t God’s causing the collapses in fact violate those probabilities? Wouldn’t there have to be something like a divine statistical footprint, if God caused those collapses?” This objection rests on false assumptions. Consider the collapses that occur at a given time or during a given period—a second, let’s say. Each collapse will be to a specific eigenstate of some observable; call the conjunction of all those specific eigenstates a “superconfiguration”. Any particular superconfiguration for a given moment or period will presumably be monumentally improbable. Now the objector seems to think we can somehow see or know, if only vaguely, that the probabilistic pattern of the superconfigurations that actually occur at a time or over a period of time is different from what it would be if God had caused the collapses. But how could we discover or know or see a thing like that? Specifying any particular superconfiguration would be a bit beyond our powers (impressive though they be); the same goes in spades for specifying probabilistic patterns of superconfigurations; and the same goes for determining how these would or wouldn’t be different if the collapses were divinely caused. Look at it from this angle: suppose God has in fact caused all the collapses; how could one argue that some probabilistic pattern of superconfigurations must be different from what it otherwise would have been?⁶⁴

But what about miracles? What about the parting of the Red Sea, changing water into wine, raising Lazarus from the dead? Most crucially, what about the resurrection of Jesus? Miracles are a mixed lot: some are unproblematically compatible with QM, but, as we saw above, about others (changing water into wine, for example) the experts do not display unanimity. However, even if all the usual candidates for miraclehood are in fact compatible with QM in the sense that their occurrence is not flatly inconsistent with the latter, there is another way in which some could be incompatible with it. Perhaps some of the suggested miracles, while not flatly excluded by QM, are so improbable (given QM) that they wouldn't be expected to occur in a period 10^{10} times the age of the universe; such a miracle, if it were to occur (and if we were to think of QM as universally applicable), would *disconfirm* QM, and in that sense would be incompatible with it.

Of course it is far from obvious that miracles *are* incompatible with QM in either of these ways; finding a problem with them out of deference to QM seems a bit premature, if not Quixotic. But suppose certain miracles would be incompatible with QM in one or another of these ways. Would that produce a problem for supposing that those miracles have actually occurred? I think not. Of course we can't think about natural laws as we did with respect to the old picture. There, we followed John Mackie in the supposition that natural laws describe the material universe as it behaves when it is causally closed; on DCC, however, God is constantly acting specially in the world and the material universe is never causally closed. Therefore we must content ourselves with something vaguer: on those occasions where God's action results in states of affairs incompatible with QM in either of the above two ways, God is treating his world differently from the way in which he ordinarily treats it; and the laws of nature, including QM, should be thought of as descriptions of the material universe when God is not treating what he has made in a special way. Here, as often, it's not at all easy to say what constitutes a *special* way of treating the world (remember Wittgenstein on "going on in the same way"), but we do have an intuitive sense for the idea.

"But doesn't this result in divine determinism, perhaps even occasionalism, in that God really causes whatever happens at the macro-level?" Here, still another virtue of DCC comes into view. Just as it could be that God causes collapse-outcomes and does so freely, so it could be that we human beings, dualistically conceived, do the same thing. Suppose human beings, as the vast bulk of the Christian tradition has supposed, resemble God in being immaterial selves, immaterial substances—although in their case (but not in his), selves intimately connected with a particular physical body.⁶⁵ Suppose, further, God has endowed human selves (and perhaps other agents as well) with the power to act freely, freely causing events in the physical world. In the case of human beings, this power could be the power to cause events in their brains and hence in their bodies, thus enabling them to act freely in the world. And suppose, still further, the specific proximate events human beings can cause are quantum collapse-outcomes. The thought would be that God's action constitutes a theater or setting for free actions on the part of human beings and other persons—principalities, powers, angels, Satan and his minions, whatever. God sets the stage for such free

action by causing a world of regularity and predictability; but he causes only some of the collapse-outcomes, leaving it to free persons to cause the rest.⁶⁶ If so, our action in the world (though of course vastly smaller in scope) resembles divine action in the world; this would be still another locus of the *Imago Dei*. Here we see a pleasing unity of divine and human free action, as well as a more specific suggestion as to what mechanism these actions actually involve.

Of course, questions remain. DCC is tied to a particular version of quantum mechanics; what happens if that version gets jettisoned? Indeed, what happens if quantum mechanics itself gets jettisoned or seriously revised? First: if Christian belief is true, the warrant for belief in special divine action doesn't come from quantum mechanics or current science or any science at all; these beliefs have their own source of warrant.⁶⁷ Of course, there could be defeaters for these beliefs; but as we've seen, current science provides no such defeaters, and the theological objections proposed seem weak *in excelsis*. So what we should think of special divine action doesn't depend on quantum mechanics or versions thereof, or on current science more generally. Indeed, what we should think of current science can quite properly depend, in part, on theology. For example, science has not spoken with a single voice about the question whether the universe has a beginning: first the idea was that it did, but then the steady state theory triumphed, but then Big Bang cosmology achieved ascendancy, but now there are straws in the wind suggesting a reversion to the thought that the universe does not have a beginning. The sensible believer is not obliged to trim her sails to the current scientific breeze on this topic, revising her belief on the topic every time science changes its mind; if the most satisfactory Christian (or theistic) theology endorses the idea that the universe did indeed have a beginning (isn't eternal), the believer has a perfect right to accept that thought. Something similar goes for the Christian believer and divine action in the world.

But where Christian or theistic belief and current science can fit nicely together, as with DCC, so much the better; and if one of the current versions of quantum mechanics fits better with such belief than the others, that's a perfectly proper reason to accept that version. True, this version may not win out in the long run (and the same goes for quantum mechanics itself); so the acceptance in question (as of quantum mechanics itself) must be provisional. Who knows what the future will bring? But we can say at least the following: at *this* point, given *this* evidence, this is how things look. And that's as much as can be said for any scientific theory.

Acknowledgements

My thanks to Alex Arnold, Andrew Bailey, Brian Boeninger, Katherine Brading, Eric Hagedorn, Marcin Iwanicki, Matthew Lee, Craig Lent, Ric Otte, Brad Monton, Dan McKaughan, J. Brian Pitts, Bas van Fraassen, Luke Van Horn, Rene van Woudenberg, and in particular Mike Bergmann; thanks also to the others whom I have inadvertently overlooked. Bas van Fraassen was unpersuaded, but was nonetheless kind enough to try to preserve me from major blunders. I'd like to ascribe the remaining major blunders to him, but no one would believe me.

Endnotes

- 1 The question of intervention, of course, arises only in the context of theism, where God is thought of as an all-powerful, all-knowing and wholly good *personal agent*—one who acts. It does not arise with respect to non-theistic conceptions of the divine, for example the thought that the divine is Being itself.
- 2 Peter van Inwagen suspects this requirement of concurrence is no more than a matter of paying God superfluous metaphysical complements; why add this to all the rest? One possibility is that conservation is a matter of sustaining a substance in existence, while concurrence is a matter of conserving a particular causal power in the conserved substance. Another possibility, one that no doubt was not foremost in the minds of the medievals, is that concurrence can be useful with respect to the so-called pairing problem: see John Foster, *The Immaterial Self: A Defence of the Cartesian Dualist Conception of the Mind* (London: Routledge, 1991), 163ff; Jaegwon Kim, "Lonely Souls: Causality and Substance Dualism," in *Soul, Body, and Survival*, ed. Kevin Corcoran (Ithaca: Cornell University Press, 2001), 30–43; and my "Materialism and Christian Belief," in *Persons: Divine and Human*, ed. Peter van Inwagen and Dean Zimmerman (Oxford: Clarendon Press, 2007), 130ff.
- 3 But what is "mere chance"? And is it even possible that something happen by chance in a world created by an all-powerful and all-knowing God? A fascinating and relevant question, one we'll have to bracket for now.
- 4 See Calvin, *Institutes of the Christian Religion* III, ii, 7; Aquinas, *Summa Theologiae* II–II q. 2, a. 9; and my *Warranted Christian Belief* (New York: Oxford University Press, 2000), ch. 8.
- 5 *Summa Theologiae* II–II, q. 2, a. 9, reply ob. 3 (my emphasis). According to Aquinas, therefore, faith is produced in human beings by God's action: "... for since in assenting to the things of faith a person is raised above his own nature, he has this assent from a supernatural source influencing him; this source is God. The assent of faith, which is its principal act, therefore, has as its cause God, moving us inwardly through grace" (ST II–II, q. 6, a. 1, *respondeo*).
- 6 "Cosmology, Ontology and the Travail of Biblical Language," *Journal of Religion* 41 (1961): 31. See also, for example, Gordon Kaufman, "On the Meaning of 'Act of God'," in *God the Problem* (Cambridge: Harvard University Press, 1972), 134–135. Gilkey goes on to say that from this perspective the Bible becomes, not a description of God's mighty acts, but a book of Hebrew interpretation: "[T]he Bible is a book of the acts Hebrews believed God might have done and the words he might have said had he done and said them—but of course we recognize he did not" (33). In speaking of what "contemporary theology" does or doesn't expect, Gilkey is not, of course, speaking for all his contemporaries; there were (and are) many theologians who are much less impressed by the Enlightenment picture, some because they see that contemporary science has moved far beyond that picture.
- 7 *Existence and Faith*, ed. Schubert Ogden (New York: Meridian Books, 1960), 291–292. In "New Testament and Mythology," in *Kerygma and Myth: A Theological Debate*, ed. Hans Werner Bartsch, trans. Reginald H. Fuller (London: Billing and Sons Ltd., 1957), 1–44. Bultmann goes on to make that famous remark about how "It is impossible to use light and the wireless and to avail ourselves of modern medical and surgical discoveries, and at the same time to believe in the New Testament world of daemons and spirits." Writing some 75 years earlier, David Strauss anticipatorily concurs: "all things are linked together by a chain of causes and effects, which suffers no interruption" (*The Life of Jesus, Critically Examined*, ed. Peter Hodgson, trans. George Eliot (Philadelphia: Fortress Press, 1972), sec. 14). Quoted in Van Harvey, *The Historian and the Believer* (New York: Macmillan, 1966), 15.
- 8 *Principles of Christian Theology*, 2nd ed. (New York: Charles Scribner, 1977), 248.
- 9 See Aquinas, *Summa Theologiae* II–II q. 2, a. 9; Calvin, *Institutes of the Christian Religion* III, ii, 7; and my *Warranted Christian Belief*, ch. 8.

- 10 A less charitable explanation: these theologians suffer from disciplinary low self-esteem, want desperately to be accepted by the rest of the academic world, and thus, given the current academic climate, adopt a more-secular-than-thou attitude. For another less charitable explanation, see my *Warranted Christian Belief*, 405, footnote 62.
- 11 As Alexander Pope put it in his famous epitaph:

"Nature and nature's law lay hidden in night;
God said 'Let Newton be' and all was light."

- 12 See, for example, Y. Elkana, *The Discovery of the Conservation of Energy* (London: Hutchinson, 1974), ch. 2.
- 13 Although not (contrary to Leibniz) what we might call a *strictly* mechanical machine (i.e., a machine where all the forces operate by contact); Newtonian gravity, of course, is a force that acts at a distance.
- 14 See William P. Alston, "God's Action in the World," in *Divine Nature and Human Language* (Ithaca: Cornell University Press, 1989), 211–213, and "Divine Action, Human Freedom, and the Laws of Nature," in *Quantum Cosmology and the Laws of Nature: Scientific Perspectives on Divine Action*, ed. Robert John Russell, Nancey Murphy, and C. J. Isham (Vatican City: Vatican Observatory Publications, and Berkeley: The Center for Theology and the Natural Sciences, 1999), 189–191. As some might now like to put it, the natural laws describe the material universe provided the time and space derivatives of the Lagrangian of the material universe considered as a physical system are zero.
- 15 Boston: Addison-Wesley, 1963, 186 (my emphasis).
- 16 *Ibid.*, 415.
- 17 *The Miracle of Theism* (Oxford: Oxford University Press, 1982).
- 18 Is there any conception of law on which it is possible that God "break" a law of nature? David Hume and David Lewis think of a law as an exceptionless generalization, one that (according to Lewis) displays a best combination of simplicity and strength; but then any generalization that gets "broken" wasn't a law after all. If laws are exceptionless generalizations, then it isn't possible for anyone, including God, to break what is in fact a law; what is not ruled out is the possibility of acting in such a way that a proposition which is in fact a law, would not have been one. The whole idea of breaking natural law seems to arise from an unhappy (if historically explicable) analogy between the moral law promulgated by God and the natural laws he ordains for his creation.
- 19 *A Philosophical Essay on Probabilities*, trans. F. W. Truscott and E. L. Emory (New York: Dover, 1951 (first published in 1812)), 4.
- 20 Arthur Peacocke, "God's Interaction with the World," *Chaos and Complexity*, ed. Robert John Russell, Nancey Murphy and Arthur Peacocke (Vatican City: Vatican Observatory, and Berkeley: the Center for Theology and the Natural Sciences, 2nd ed., 2000), 267. Peacocke refers, in this connection, to Michael Berry, "Breaking the Paradigms of Classical Physics from Within," 1983 Cergy Symposium *Logique et Théorie des Catastrophes*.
- 21 See, for example, David Papineau, "The Rise of Physicalism," in *Physicalism and its Discontents* (Cambridge: Cambridge University Press, 2001), 15, 17.
- 22 At any rate, if he thought of the relevant laws as those of classical science. If we countenance the possibility of more complex laws, then, perhaps, for any course of special divine action in the world, there is a set of laws such that they together with conditions at a time t entail the state of the universe at any other time t^* (including that course of action). Of course, for many such possible courses of special divine action, the associated laws of this sort would be monumentally complex and wholly beyond our ability to state, let alone discover.
- 23 Two caveats. First, for a suggestion as to how I could have the power to take an action A such that if I were to take A , then some state of affairs that was in fact actual, would not have been actual, see my "On Ockham's Way Out," *Faith and Philosophy* 3: 3 (July 1986): 235–269. Second, the thought that the laws are not within my power depends on how

one conceives the laws. If, following Hume and David Lewis, you think of the laws as supervening on matters of particular fact (as, substantially, mere descriptions of what has, does, and will in fact happen), then I might well be able to do something such that if I were to do it, then a proposition which is in fact a law would not have been one. For consider some law L that bears on what I do: perhaps the law, together with other things, entails that I raise my hand at t . If this law is no more than a complex descriptive generalization, then it describes a situation that includes, among other things, my raising my hand at t . But so far this is entirely compatible with my having the power to refrain from raising my hand at t ; the mere fact that I *will* raise my hand then, doesn't imply, by itself, that it will not be within my power to *refrain* from raising it then. And of course if I were to refrain from raising my hand, then L would have been false and hence would not have been a law.

- 24 Here I assume that the ability to do otherwise is a necessary condition of free action; I bracket Frankfurtian concerns as taking us too far afield. For the canonical version of the argument that freedom is incompatible with determinism, see Peter van Inwagen's "Consequence Argument," in *An Essay on Free Will* (Oxford: Clarendon Press, 1983).
- 25 It isn't only hands-off theology that we owe to the Laplacean picture; it is also (anachronism aside) partly responsible for the critical philosophy of Immanuel Kant. If the material universe is a closed system, there is no room for free human action. The material universe, of course, includes human bodies; and it is this picture of the material universe, including our own bodies, going its own merry way, each preceding state of it sufficient for the succeeding state, with no room in it for free human action, that absorbed Kant's attention. Of course Kant tried to solve the problem by a sort of radical segregation: causal closure reigns supreme in the phenomenal world; the noumenal realm, however, somehow permits or involves or underwrites human freedom. The details (and indeed the main lines) are a bit baroque and more than a bit obscure; what is of present interest, though, is that Kant's problem was set by his endorsing the Laplacean picture. It is also worth noting that in his case, as in the case of the hands-off theologians, it isn't at all the physics or the classical science as such that sets the problem.
- 26 See (among many others) Richard Swinburne's *The Evolution of the Soul* (Oxford: Oxford University Press, 1997); and my "Against Materialism," *Faith and Philosophy* 23: 1 (January 2006): 3–32 and "Materialism and Christian Belief," in *Persons: Human and Divine*, 99–141.
- 27 It is by no means trivial to say just what a physical state of the universe *is*; on pain of triviality, we must suppose at least that a description of the state of the universe at a time t doesn't implicitly refer to or describe the universe or parts of it at some other time t^* . Thus, for example, $S(t)$ couldn't properly include the existence of a person described as the grandmother of someone born at t^* ($t \neq t^*$); nor could $S(t)$ include the laws holding then. Perhaps it would do to take the relevant description as a function assigning to each particle a mass, position and velocity.
- 28 For present purposes, I suggest we understand quantum mechanics *realistically*: that is, take the theory as an effort to describe the world (as opposed, for example, to an attempt to come up with a theory that is empirically adequate, whether or not true). This is a non-trivial suggestion; given the weird, fitful, intermittent, shadowy, evanescent, nature of the quantum world, antirealism of the sort proposed by Bas van Fraassen (see, e.g., his *The Scientific Image*) is certainly attractive.
- 29 *Oxford Handbook of Metaphysics*, ed. Dean Zimmerman and Michael Loux (Oxford: Oxford University Press, 2003), 461. Maudlin gives a particularly clear and cogent explanation of the essentials of quantum mechanics and the relation between the quantum mechanical formalism and its interpretations.
- 30 Things are complicated by the fact that there are interpretations of or, better, approaches to quantum mechanics that are said to be deterministic; the best known of these is Bohmian mechanics. Since Bohmian mechanics is empirically equivalent to QM *simpliciter*, it is also indeterministic in the same sense as QM *simpliciter*: it predicts, not specific outcomes, but

- statistical patterns of probabilities. But it is deterministic in another sense, in that it postulates a further law (the "guiding equation") that, together with the Schrödinger equation for the universe and the initial configuration of mass/energy at the beginning of the universe (and given causal closure of the physical), completely determines its subsequent states. Of course, that initial configuration isn't available to us.
- 31 I take the name from Wesley Wildman, "The Divine Action Project, 1988–2003," *Theology and Science* 2 (2004), 31–75.
- 32 "God's Interaction with the World," in *Chaos and Complexity*, 277–278. Elsewhere he adds, "So we have to accept the interplay of chance and laws as the node of God's creativity. It seems to me to be more consistent with the fundamental creativity of reality than the belief—stemming from a Newtonian, mechanistic, determinist view of the universe with a wholly transcendent God as the great lawgiver—that God intervenes in the natural nexus for the good or ill of individuals or society" ("Chance and Law," in *Chaos and Complexity*, 142).
- 33 *God and Contemporary Science* (Edinburgh: Edinburgh University Press, 1997), 195, 203, 206.
- 34 Wildman, *op. cit.*, 38.
- 35 "The Theology of the Anthropic Principle," *Quantum Cosmology and the Laws of Nature*, 384.
- 36 "Ordinary and Extraordinary Divine Action," in *Chaos and Complexity*, 383.
- 37 *Ibid.*, 384.
- 38 *Divine Action and Modern Science* (Cambridge: Cambridge University Press, 2002), 48.
- 39 This objection is widely shared. In the course of a defense of deism, Maurice Wiles responds to the testimony of Christians claiming to benefit from divine intervention: "In many cases the nature of such claimed interventions seems trivial when set in the context of Auschwitz and Hiroshima, which no providential action prevented." "Divine Action: Some Moral Considerations," in *The God Who Acts*, ed. Thomas Tracy (University Park: Pennsylvania State University Press, 1994), 22.
- 40 Compare St. Paul: "How unsearchable are his judgments and how inscrutable his ways!" *Romans* 11:33.
- 41 See Stephen J. Wykstra, "The Humean Obstacle to Evidential Arguments from Suffering: On Avoiding the Evils of 'Appearance'," *International Journal for Philosophy of Religion* 16 (1984), 73–93.
- 42 Some make the same suggestion about science: science, they say, would be impossible if God intervened in the world.
- 43 Note its occurrence also in the quotations from Bultmann above, 7; Mackie (above, 16) uses the word "intrusion."
- 44 The same goes with respect to science and technology. Surely the occasional miraculous cure of cancer, for example, wouldn't make it impossible to seek a more ordinary cure for the disease.
- 45 *Systematic Theology* (London: Nisbet, 1953), vol. 1, 129; quoted in Alston's "God's Action in the World," 209.
- 46 Saunders, *loc. cit.*
- 47 "Evolution and Special Creation," *Zygon* 28: 3 (September 1993): 324. Note that McMullin doesn't object to "intervention" and miracles in *Heilsgeschichte*; he's talking just about *Naturgeschichte*.
- 48 See endnotes 4 and 5.
- 49 And even if we thought of a law as the result of deleting the antecedent from (NL), taking a law to be an exceptionless generalization, it still wouldn't be possible for God to act in a way contrary to a natural law (although it would be possible for him to act contrary to a proposition that would have been a natural law but for that act).
- 50 Indeed, how *could* an intervention occur at t_0 ? What occurs at t_0 would be the initial conditions, and presumably the initial conditions would simply be a result of the initial

- divine creative act, in which case the action resulting in the initial conditions would not be an action that goes beyond creation and conservation.
- 51 The unduly scrupulous might object that while there is a time t^* after t such that $S(t) \& L$ does not entail $S(t^*)$, perhaps there is no first such time: perhaps the interval in question is open. I leave to them the project of making the necessary repairs.
 - 52 Robert Russell, "Divine Action and Quantum Mechanics," in *Quantum Mechanics: Scientific Perspectives on Divine Action*, ed. Robert John Russell, Philip Clayton, Kirk Wegter-McNelly, and John Polkinghorne (Vatican City: Vatican Observatory Publications, and Center for Theology and the Natural Sciences, 2001), 295; Wesley Wildman, 50.
 - 53 Philip Clayton, "Wildman's Kantian Skepticism: A Rubicon for the Divine Action Debate," *Theology and Science* 2: 2 (October 2004): 187.
 - 54 Thomas Tracy, "Scientific Perspectives on Divine Action? Mapping the Options," *Theology and Science* 2: 2 (October 2004): 197.
 - 55 "The Divine Action Project," 38.
 - 56 "The Divine Action Project: Reflections on the Compatibilism/Incompatibilism Divide," *Theology and Science* 2: 2 (October 2004): 194.
 - 57 *Chance and Providence* (New York: Scribner, 1958).
 - 58 Robert Russell, "Quantum Physics in Philosophical and Theological Perspective," in *Physics, Philosophy and Theology: A Common Quest for Understanding*, ed. Russell, William Stoeger, and George Coyne (Vatican City: Vatican Observatory, 1988), 343 ff., and "Divine Action and Quantum Mechanics: A Fresh Assessment," in *Quantum Mechanics: Scientific Perspectives on Divine Action* (hereafter QM) (Vatican City: Vatican Observatory, 2001), 293 ff; Nancey Murphy, "Divine Action in the Natural Order: Buridan's Ass and Schrödinger's Cat," in *Chaos and Complexity*, 325 ff.; Thomas Tracy, "Particular Providence," in *Chaos and Complexity*, 315–322, and "Creation, Providence, and Quantum Chance," QM, 235 ff. See also the pieces by Philip Clayton and George Ellis in QM.
 - 59 "The Metaphysics of Divine Action," in *Chaos and Complexity*, 152–153.
 - 60 G. C. Ghirardi, A. Rimini, and T. Weber, "Unified Dynamics of Microscopic and Macroscopic Systems," *Physical Review D* 34 (1986): 470 ff.; see also G. C. Ghirardi, "Collapse Theories," in *The Stanford Encyclopedia of Philosophy* (Spring 2002), ed. Edward N. Zalta, available at <http://plato.stanford.edu/archives/fall2007/entries/qm-collapse/>.
 - 61 "Collapse Theories," Section 5.
 - 62 There is also the so-called "counting problem" for collapse theories proposed by P. Lewis ("Quantum Mechanics, Orthogonality, and Counting," *British Journal for the Philosophy of Science* 48 (1997): 313 ff.): the problem alleged is that each of a large number of marbles may be in a box, while it is false that all the marbles are in the box. For a resolution, see Bradley Monton, "The Problem of Ontology for Spontaneous Collapse Theories," *Studies in History and Philosophy of Modern Physics*.
 - 63 But see below, 394.
 - 64 In *Divine Action and Modern Science* (Cambridge; Cambridge University Press, 2002), Nicholas Saunders raises further objections to the thought that God acts at the quantum level; these objections are nicely dealt with in Thomas Tracy's review of the book (*Notre Dame Philosophical Reviews*, online).
 - 65 Current objections to dualistic interactionism are vastly overrated; see my "Against Materialism," as well as "Materialism and Christian Belief," especially 120–136. One objection often raised to dualistic interactionism is that it would violate the principle of the Conservation of Energy. The main answer here is the same as that to the above objections to divine action in the world: this principle is stated for closed systems; but any physical system (such as a brain) in which an immaterial substance caused a change would obviously not be a closed system. It's also worth noting, however, that spontaneous collapse theories reject the principle of conservation of energy; energy is

not conserved when a GRW collapse happens. See Bradley Monton, "The Problem of Ontology for Spontaneous Collapse Theories."

66 This suggestion as to the mechanism of free human action works much better for dualism than for the materialism that, sadly enough, is becoming more common among Christian thinkers. In my view this is less a limitation of the suggestion than another strike against materialism, which is in any event implausible from a Christian perspective; see the preceding footnote.

67 See my *Warranted Christian Belief*, part III, especially chaps. 8 and 9.

Biographical Notes

Alvin Plantinga is John. A. O'Brien Professor of Philosophy at Notre Dame University, Indiana. He has published extensively in the areas of epistemology and philosophy of religion. His works include *Warranted Christian Belief* (Oxford University Press, 2000) and *Knowledge of God* (with Michael Tooley, Blackwell, 2008).