

Engaging Robert J. Russell's Alpha and Omega

with Nancey Murphy, "Robert John Russell versus the New Atheists"; John F. Haught, "Is Physics Fundamental?"; Michael Ruse, "Gaps in the Argument"; Willem B. Drees, "Robert J. Russell's Eschatological Theology in the Context of Cosmology"; Robert J. Russell, "Cosmology from Alpha to Omega: Response to Reviews"

COSMOLOGY FROM ALPHA TO OMEGA: RESPONSE TO REVIEWS

by Robert John Russell

Abstract. I gratefully acknowledge and respond here to four reviews of my recent book, *Cosmology from Alpha to Omega*. Nancey Murphy stresses the importance of showing consistency between Christian theology and natural science through a detailed examination of my recent model of their creative interaction. She suggests how this model can be enhanced by adopting Alasdair MacIntyre's understanding of tradition in order to adjudicate between competing ways of incorporating science into a wider worldview. She urges the inclusion of ethics in my model and predicts that this would successfully challenge the competing naturalist tradition in contemporary society. John F. Haught weighs the alternatives of viewing divine action as objective versus subjective and of divine action at one level in nature or at all levels. He asks whether physics is fundamental to nature, arguing instead that metaphysics should be considered as fundamental. Michael Ruse assesses occasional versus universal divine action, the problems raised to divine action when it is related to quantum mechanics, and the way these relations exacerbate the challenge of natural theodicy. As an alternative he suggests viewing God as outside time and acting through unbroken natural law. Willem B. Drees discusses my use of the bridge metaphor for the relation between theology and science, the implications when science is inspired by theology, the role of contingency and necessity in the anthropic principle/many-worlds debate, and the challenge of cosmology to eschatology with the ensuing problem of theodicy.

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I am very grateful to my colleagues Nancey Murphy, John F. Haught, Michael Ruse, and Willem B. Drees for their time and effort in reviewing my book *Cosmology from Alpha to Omega: The Creative Mutual Interaction of Theology and Science (CAO)*. I also am grateful to Wim as editor of *Zygon* for giving me this opportunity to respond. I am touched by the many kind and appreciative personal comments from the reviewers about *CAO*, a collection of essays published over the past two decades and brought together through a series of interwoven themes and a developing methodology. My task here is to respond, in a relatively short fashion, to some of the key questions and criticisms raised by them.

NANCEY MURPHY

Unlike the other reviewers, who focus their attention primarily on *CAO*, Murphy uses *CAO* as a fruitful springboard for a direct attack on the increasingly strident claims of “scientific naturalists.” She offers two reasons for the importance of my work: (1) I have joined other scholars in bolstering the argument for the consistency of Christian theology and natural science, and (2) in doing so I have done what scientific naturalists have not: set out a careful model for the ways in which science and theology creatively interact. My work in fact underscores their “lack of attention given to the connections between science and naturalism.” It is to justify the latter point that Murphy devotes the bulk of her essay. I do not summarize her article here but select a number of points for comment.

I greatly appreciate Murphy’s urging us to adopt Alasdair MacIntyre’s understanding of tradition in order to adjudicate rationally among competing ways of incorporating science into a wider worldview. According to Murphy, “MacIntyre’s account of rationality is the most sophisticated available” compared to others such as that of Imre Lakatos. I look forward to exploring Murphy’s call to use MacIntyre’s approach in my future work. (Three examples of my use of Lakatos, following Murphy’s earlier lead, are discussed in *CAO*, pp. 16–20.)

I do have two initial questions for Murphy. First, she writes that “Lakatos never gave a satisfactory answer to [Paul Feyerabend’s] challenge”; because “degenerating” research programmes can become progressive again “one never knows when it is rational to give [them] up.” I would have thought that Murphy’s lengthy discussion of Lakatos’s three meanings of *ad hocness* (and her publications about their role in humanities research) did, in fact, give us rational reasons for changing programmes, even though, as Feyerabend points out, they are no guarantees that staying with a failing programme is

irrational. (An interesting current example of this is the continued development of Hoyle-style cosmologies, including cyclic universes, that contend with the overwhelmingly dominant inflationary Big Bang cosmologies.)

Second, she tells us that MacIntyre's "central insight" is that a robust program may explain the failure of its rival, including why it failed "at just the point it did." I wonder if MacIntyre's point here is similar to the argument advanced decades ago by physicist Charles Misner: We can know where a theory in physics is right precisely by knowing where and why it is wrong. So, for example, we know that Newtonian mechanics is right whenever we are dealing with velocities far below that of light and sizes far greater than the relevant Compton wavelength. Because Murphy claims that MacIntyre's insight moves us beyond the Lakatos-Feyerabend "stalemate," it would be interesting to see how Misner's insight is related to that of MacIntyre's.

I turn now to Murphy's two very substantive suggestions under her section "A Way Ahead?" First, she proposes that "it is essential to relate ethics both to an account of ultimate reality and to the social sciences and biology." She and coauthor George F. R. Ellis make a very convincing case for this claim, in my view, in their groundbreaking publication *On the Moral Nature of the Universe: Theology, Cosmology, and Ethics* (1996). Murphy suggests that "[Russell] could incorporate into his corpus an argument something like Ellis's and mine on the placement of ethics in the hierarchy of the sciences, just below theology. . . . In this case he would be solving a problem that I predict the naturalist tradition will not, namely, how to account for the morally binding character of ethics." I thoroughly agree with Murphy on the importance of including ethics in the hierarchy of the sciences, and I am encouraged by her insight that this would solve a problem that naturalists might not be prepared for. Second, Murphy writes that in doing so we could enhance "the contribution our work makes to the justification of our Christian tradition vis-à-vis the naturalist tradition. . . ." This would strengthen arguments "for the indispensability of the science-theology dialogue" and possibly gain a more balanced response by naturalists. Again I agree with Murphy.

Clearly Murphy's suggestions require a more lengthy and careful consideration and discussion than I can offer here. For now I attend to three points. First, how best should we picture the relation between disciplines that study increasingly *encompassing* phenomena and those that study increasingly *complex* phenomena? Murphy and Ellis propose a branching topology that represents encompassing on the left and complexity on the right. Starting with physics, then chemistry, then biology, their diagram branches to the left with geology/ecology, astrophysics, and cosmology, and to the right with psychology, the social and applied sciences, motivational studies, and ethics (1996, 65). To integrate both branches they place metaphysics (theology) at the top of the topology (p. 204), and they offer robust reasons for this topology.

Nevertheless, for various historical reasons I have been relying on Arthur Peacocke's understanding of the relations between the disciplines, which traces back to the 1970s and 1980s. His approach is a two-dimensional representation in which the vertical indicates increasing complexity while the horizontal indicates increasing encompassment. Vertically he portrays the sciences as ranging from the physical at the bottom to the biological and neurosciences to behavioral sciences and finally the "cultural disciplines" including arts, humanities, religion, and so on at the top—and presumably ethics (see *CAO*, p. 8, Peacocke's figure). So by working with Peacocke's picture I have incorporated ethics into this overall holistic epistemology Murphy is calling for. I would be interested in her reaction to this fact.

Second, what I appreciate about Peacocke's diagram more than the diagram of Murphy and Ellis is that cosmology is seen as a specialization within physics, thus lying at the lowest level and the furthest to the right, indicating that it encompasses Big Bang cosmology and its successors. Lying at the lowest level allows it to put constraints on all of the other disciplines from biology to cultural studies, disciplines that rise above it in their capacity for complexity and novelty and that cannot be reduced without remainder to the lower levels. This constraints-with-irreducibility interpretation of epistemic emergence I find immensely valuable. It allows me, for example, to argue that theology, residing at the top of Peacocke's diagram, is maximally constrained by the sciences. For example, it cannot ignore the implications of the expanding universe on Christian eschatology, even while eschatology cannot be reduced to it (no offense to Frank Tipler's "physical eschatology"). I would greatly appreciate Murphy's reflections on the relative value of her epistemology's topology to that of Peacocke.

Third, Murphy insists that the inclusion of ethics in the "grand scheme" may strengthen the justification for the Christian tradition and the crucial importance of the science-theology dialogue. I entirely agree. One way to appreciate this point is that the inclusion of ethics in a holistic epistemological scheme such as hers would ratify why suffering in nature ("natural evil") is a real problem to be treated redemptively and not just a phenomenological reality to be accepted stoically. The latter is often the naturalist position, while the former typifies the angst of many theists. By placing ethics above the natural and social/psychological sciences in a holistic epistemology, ethics transcends these sciences even while they place constraints on ethics, thus promoting the theology-science dialogue.

And a closing suggestion: Without placing theology in the diagram above ethics, we might wind up with an autonomous, secular, and utilitarian ethics that justifies suffering in the history of life on earth by a "means/end" argument. It is even possible that a secular ethics without revelation would suggest that there is a valid option between valorizing a god who

rules over the infinities of universes as long as life somewhere arises (see Ruse below) and a God who identifies with the estranged, brutalized, and death-ridden in this universe in order to heal and redeem life for everlasting joy. If Murphy's suggestions help to unmask the former as a false and dangerous option, it leads me even more strongly to take up her proposal with joy.

JOHN F. HAUGHT

Haught raises several concerns in his review, starting with the problem of divine action. According to him, I believe that "Christian faith has no substance and must be considered illusory" if divine action is not "objectively real" but "simply a human construct." Let me set the record straight: this is *not* my view of Christian faith. Like almost all Protestant and Roman Catholic theologians (with notable exceptions among the process theologians), I begin with the claim that the sheer existence of each and every event, creature, or process in nature and history, along with the totality of them—the "world" or the "universe"—is the direct, objective (real) and unmediated result of God's action as Creator *ex nihilo*. (I define *direct*, *objective*, and *unmediated* in *CAO*, pp. 121–22.) I also claim that God acts in history and in nature in special ways, something the tradition calls special providence. Where I differ from such liberal theologians as Friedrich Schleiermacher and Rudolf Bultmann is in refusing to reduce *all* claims about these acts entirely to strictly subjective religious experience. Instead I believe that religious language about special providence can, at least in principle, refer to something that God actually did in history and in nature. More important, I believe that a philosophy of nature that points to ontological indeterminism, or genuine openness, in nature allows theologians to conceive of objective divine action without thinking of it as interventionist. This means that if nature is genuinely open, God can act without suspending or violating the ordinary processes in nature—processes that God creates and holds in being. But does science provide a basis for such a philosophy and thus for a noninterventionist theological account of divine action? And if it does, does science do so for every level of complexity in nature from quarks to quasars and from bacteria to the great apes? Most important, does such objective, but noninterventionist, divine action (NIODA) cash out the promissory meaning of the "God of evolution" which the spectrum of theistic evolutionists proclaim?

Haught writes that the "most problematic" of my claims is that the *only* level where God acts *directly* to cause specific effects is that of quantum mechanics. For the rest of nature, divine action is entirely the indirect result of God's direct action at the quantum level. Actually I *do* believe that God acts directly at many, perhaps all, levels of nature and that God does so without intervening in nature (that is, without suspending or breaking into the ordinary processes of nature). The problem is that, except for the

quantum level, I cannot justify this claim *within the context and methodologies of the theology-science dialogue*. The reason I cannot is that *noninterventionist* divine action requires ontological indeterminism at the level in which God's acts are *direct and mediated* acts. And (*pace* Peacocke and John Polkinghorne, see *CAO* pp. 129–37) I can make a clear case for such *noninterventionist objective* divine action only at the quantum level. To anticipate Haught's possible response to this, it is not just a matter of getting the metaphysics right (see my critique of Ian G. Barbour's position on pp. 137–40). The right metaphysics can at most give you the conceptual framework for thinking about divine action in nature, but we still need evidence for indeterminism from a particular and proven scientific theory if we are to complete the case. I hope that in the future other approaches to NIODA will be successful at arguing for forms of indeterminism in many of nature's levels of complexity because, again, I personally believe God acts directly at many, perhaps all, levels without intervening in nature.

What do I mean to suggest by writing that physics is "fundamental"? Haught raises another crucial issue: He claims that I take "the quantum domain to be the *underlying* (p. 156) or *foundational* level (pp. 152, 161) of nature's being," that in my view the quantum level is "nature's *bottom rung* (p. 156)," and that the physics of the quantum level is a "*fundamental* theory of nature (p. 161)." This issue is reflected in the title of Haught's response, "Is Physics Fundamental?" Haught prefers to turn to metaphysics as fundamental, suggesting that "the sphere of quantum events delineated by microphysics is elemental, not fundamental. . . . Russell, however, thinks of quantum events as ontologically fundamental."

Actually I agree with Haught about metaphysics being fundamental in a way that no science, physics or otherwise, can be. If that is what he means about physics being "elemental, not fundamental," well and good. But apparently he has conflated my description of quantum physics as a fundamental theory *in science* with what is fundamental in philosophy. He writes: "What is fundamental, or concretely actual, in nature is the complex, organic *web of relationships* from which scientists have mentally isolated such constructs as those of classical, and—one may now assume—quantum physics." Unfortunately he concludes that "Russell . . . is still taking the abstractions of science as though they are concretely fundamental."

Hopefully this conflation can be easily dispelled. I take for granted an epistemic claim widely known throughout the theology-science literature, namely, that, following Peacocke (see above), the academic disciplines form an epistemic hierarchy starting with physics at the bottom and ending with the humanities in general and theology in particular at the top (with some disagreements over the topology of the hierarchy, see Murphy-Ellis versus Peacocke above). The lower levels—those that study less complex phenomena—place epistemic constraints on the upper levels (for example, the laws of biology are constrained by, and cannot contradict, those of

physics), but the processes and properties of the upper level resist being eliminatively reduced to the lower ones (for example, some biological phenomena cannot be contained in the epistemology of physics). (Again see Peacocke's diagram on p. 8 of *CAO*.) This is the argument for epistemic holism. And this, in turn, is precisely what I mean by calling physics fundamental. There are no disciplines lying "below" physics that put epistemic constraints on its theories or provide it with clear epistemic foundations. (Note: Even within physics there is a longstanding discussion of which theories are fundamental and which are better described as phenomenological. For example, in classical physics Newtonian mechanics would be considered fundamental but hydrodynamics or meteorology as phenomenological.)

It is an entirely different matter to move from this epistemic hierarchy to the domain of metaphysics and claim that when I refer to quantum physics as foundational or fundamental in the epistemic sense I am actually referring to quantum physics as foundational or fundamental in the metaphysical sense. Not only would this be a category mistake; it also would make the elementary error of assuming that one can move effortlessly and directly from epistemology to ontology without ambiguity or a need for a justification of the choice of ontologies yielded by a specific epistemology. As Barbour made abundantly clear in *Issues in Science and Religion* more than four decades ago ([1966] 1971), it would be to make a metaphysics out of a method. So, whether one walks with Haught the Rahnerian neo-Thomist or Haught the Teilhardian or even Haught the process theologian, the choice of metaphysics is not forced by, let alone identified or to be confused with, physics. Physics may be fundamental in the sense of the epistemic hierarchy we all take for granted. It is not a fundamental *metaphysics*, let alone a necessarily Whiteheadian one. As Haught rightly says, the battlefield of metaphysics is needed "to defend the idea of nature's openness to God against materialism and mechanism," and no one, certainly not I, has or will do so by "remaining on the terrain of physics." What is missing is the additional insight that the battle will not be won by metaphysics alone but, at least for those wishing to be part of the scholarly theology-science dialogue, only in combination with vital support from scientific theories, and that support is precisely what I have hoped to offer.

MICHAEL RUSE

Ruse's review raises two key concerns, and the first has two parts. According to him I believe that we must choose between God acting at special points and God acting all the time. Given the choice, Ruse opts for the latter. "I don't like God's having to keep working at special points to keep creation going. I am happy for God to be doing it all of the time. . . . If God lost attention for a moment . . . the world would collapse at once into nonbeing." Of course he is correct that God as Creator sustains the world

in existence at all points and times, but that does not exclude God from acting in special ways, too. For me, as for most theologians, it is not the either/or Ruse accuses me of but a both/and. God acts at all times to create everything that exists, as the doctrine of creation *ex nihilo* (from nothing) affirms. God also acts in all events in what traditionally is called general providence, and God acts in special ways in particular events in what is called special providence. On p. 113 of *CAO* I write: “The doctrine of providence presupposes a doctrine of creation, but adds significantly to it,” and on pp. 180–81 I discuss divine action and general and special providence. So Ruse’s claim that we must choose among them dissolves.

Ruse worries that I have tied my theological argument for NIODA too closely to the success of quantum mechanics. “What happens if the science changes?” Actually I share his concern here. There is a potential problem in connecting theology too closely to specific theories in science such as quantum mechanics. In fact there are two distinct problems here: what I call historical relativism (which looms large when we use *any* scientific theory) and (particularly but not uniquely for quantum mechanics) “multiple interpretability.” In *CAO* and elsewhere I give detailed recommendations on how to handle both, and I would welcome Ruse’s assessment of them.

Regarding historical relativism, my point is that if we engage in theology and science at all, unavoidably we will deal with theories that may one day be found to be wrong. That is what science is all about—developing theories that can be falsified empirically à la Popper (or, with Lakatos, identifying progressive versus degenerating research programmes among rival candidates) and then incorporating them into or replacing them by new ones (depending on how you read Thomas Kuhn). Moreover, in theology and science we must work with theories on the frontiers of science and thus theories under attack. And, besides all this, Christian theology spent the better part of the eighteenth to twentieth centuries dealing with discarded classical scientific theories, as Murphy forcefully points out. It is time we caught up with current science, do our best to use it through an open-ended “what-if” strategy, and go from there—or forget about playing the game of theology and science altogether.

While we are focusing on Ruse’s first set of concerns, I should point out that he overlooks the really serious problem—the fact that quantum mechanics is subject to a multitude of interpretations that for the most part are mutually inconsistent and only one of which, presumably, is correct. Am I not playing a risky game choosing one of them, ontological indeterminism? Suppose Bohmian nonlocal hidden variables wins out, or Hugh Everett’s many minds/many worlds, or quantum logic, or . . . Then what? My response in chapters 4 (pp. 127–28) and 5 (pp. 160–64) is that I am not basing a theology of divine action on ontological indeterminism as though such indeterminism were proven and unquestioned. Instead I am taking a “what-if” strategy: What would the implications be for theology *if*

ontological indeterminism is in fact the correct interpretation? I then raise the second question: Suppose indeterminism does get overthrown tomorrow? My response to this is on pp. 193–96, where I first lay out an “architecture of philosophical problems” in quantum mechanics and suggest that there are generic features, such as nonlocality, that are not interpretation-specific and that therefore have a greater likelihood of longevity than interpretation-specific ones such as ontological indeterminism. I also suggest that the implications of Bell’s theorem will outlast quantum mechanics as a whole, and thus theological reflections on it are better safeguarded against both multiple-interpretability and historical relativity than are those such as mine, which are based on ontological indeterminism.

The second problem Ruse raises is that of natural evil and its attendant problem, natural theodicy. “If God can and does do that which is good — create humans—why not at the same time avoid some of that which is bad? . . . [Russell’s] solution to the human problem [God acts at the quantum level in DNA mutations to ensure our evolution] makes the problem of natural evil even worse.” Ruse then offers his own two-part solution. The first part is his appeal to Augustine’s God who “creates and works through unbroken law” and to Leibniz’s theodicy that the good comes along with the bad and “that is the way of the world.” The second part involves Ruse’s claim that “God is outside time.” With plenty of time to spare, God can create billions of universes; eventually humanity comes about in one of them through biological evolution. “Humans were bound to appear, and that is all God needs or cares about. To know it will happen is enough.” These together, Ruse suggests, are preferable to “letting God loose in the creation.” Ruse then asks rather plaintively, “Will Russell welcome my solution?” He is quite doubtful: “My experience is that even the best people working on the science-religion relationship tend toward blindness when it comes to my suggestions.”

Actually I do address his suggestion in Chapter 8 (pp. 253–55). Here I call the first part of his solution “theodicy lite.” It is a specific form of the generic no-choice or consequentialist theodicy: Once the laws of nature are given, laws that even God will not or cannot disturb, God has no choice but to allow them to structure the evolution of life with its attendant natural evils as a consequence of these laws.

In an interesting turn, Ruse actually offers the no-choice argument in defense of Christianity against one of its most vocal critics, Richard Dawkins, by citing Dawkins’s own reference to it: “Dawkins, however, argues strenuously that selection and only selection can do the job. No one—and presumably this includes God—could have got adaptive complexity without going the route of natural selection.”

My response in *CAO* is that

the “no choice” argument is based on a crucial assumption usually overlooked in these discussions: the assumption that the laws of physics underlying cosmology,

astrophysics, geology, chemistry, molecular and evolutionary biology, etc., are a “given.” But if we push it one step further, we see that this argument does not really help with theodicy since the question of whether God had a “choice” returns at a more fundamental level in what I will call cosmic theodicy. . . . [W]hy did God choose to create this universe with these laws and constants knowing that they would then make Darwinian evolution unavoidable and with it the sweep of natural evil? The Ruse/Dawkins argument does not rescue God from blame, but merely places blame at a more foundational level, leading to the Leibnizian challenge: is this the best of all possible universes that God could have created with the intention of the evolution of life or could there be another kind of universe in which life evolved without natural evil? In sum, “Theodicy Lite” is ultimately a fruitless theodicy, and we must move ahead. (pp. 254–55)

Before moving ahead, let me note that the success of the first Vatican Observatory/CTNS series of research conferences on “scientific perspectives on divine action” has led to our undertaking a new series of conferences on “scientific perspectives on the problem of natural evil.” In the first volume, *Physics and Cosmology: Scientific Perspectives on the Problem of Natural Evil*, I argue that a consequentialist theodicy, when taken to the level of physics and cosmology, generates what I term “cosmic theodicy.” It ends here in failure and implies even more strongly that the only response to suffering is a theology of redemption starting with the cross of Christ (Murphy, Russell, and Stoeger 2007, 109–30).

Ruse’s theodicy also places God outside of time. Because of this, God can allow humankind to arise inevitably through a many-worlds (meaning countless universes) strategy. Ruse claims that this lessens the challenge of natural theodicy because it keeps God from being involved directly in the ongoing evolution of life. Is he correct? Unfortunately I do not think that this suggestion does what Ruse thinks it does. The appeal to the creation of billions of universes backfires: It dramatically increases the amount of suffering, disease, death, and extinction by some billions of times given all those universes in which there are worlds where life evolves to, say, sentience and the capacity to suffer but without ending in humankind. This seems to be pointless, wasted, purposeless suffering on a mega-universe scale. Worse yet, Ruse’s strategy smacks of a “means-end” calculus that would apparently seek to justify the untold suffering of countless other species now magnified beyond our universe to billions of universes as long as the end result is us in *some* universe.

Ruse’s “theodicy lite” proffers a glint of gold by seeming to keep God’s hands from getting dirty the way they do when God acts, via NIODA, in and through the actual processes of evolution. Sadly, the gold turns out to be fools’ gold: A god who washes his hands of countless universes to protect himself from dealing with suffering is never a god who could do what the biblical God does or deserve the worship that the biblical God deserves. This biblical God does not turn away from but rather takes up the suffering of this world—and all of biological life in nature—into God’s own self through the Incarnation and the Cross of Christ.

Ironically, Ruse knows that the best theodicy is not the one he offers us here. Instead it is in fact the one that points to the Cross, and Ruse tells us this explicitly in the same book where he challenges Dawkins: *Can a Darwinian Be a Christian?* There he writes in a moving and profound way about Christianity's response to the problem of natural evil:

[Darwinism] stresses the natural evil in the world. It does not explain it, but it opens the way to the Christian response. . . . Right at its centre there is a suffering god, Jesus on the Cross. This in not some contingent part of the faith, but the very core of everything. . . . God is not sitting on His backside in heaven, listening to one new Haydn quartet after another. God feels pain, physical and psychological, pushed to the limit that any of us can feel. There is the agony of the crucifixion and the despair of rejection. (2001, 134)

Amen to that, Michael. I couldn't agree more.

What then about that "blindness"? It would seem that "the best people working on the science-religion relationship" are not suffering from blindness to Ruse's suggestions about an absentee, timeless, passionless god. Instead they are seeing that these suggestions are in the end a blind alley. Perhaps Michael, too, will turn decisively away from them and instead toward *his own words* just cited. Perhaps he will keep his eyes fixed not on the unclean hands of a timeless and cruel god but on the pierced hands of the crucified God—the only hope for the suffering of this world.

WILLEM B. DREES

I have often used the metaphor of a bridge, such as California's Golden Gate Bridge, to represent what I see as a constructive relationship between theology and science, with traffic on the bridge going in both directions between the two cultures that the bridge links. Drees is critical of the bridge metaphor, saying that it "suggests too much that there are two land masses, stable givens of a similar kind, and traffic flowing in both directions." Yet when I emphasize that doctrines and theories change in time, he exclaims "there go the land masses at both ends of the bridge." Drees's concern is closely related to Peacocke's critique of the bridge metaphor published in an editorial in *Theology and Science* 2:1 (April 2004). There Peacocke warned that unless theologians take more seriously the challenges from biblical scholarship and science, "the foundations of at least the theology pillar depicted on this journal's cover will continue to remain shaky—and the projected bridge incapable of carrying the weight of desired traffic."

I see the bridge metaphor somewhat differently. In an editorial in the first issue of *Theology and Science* I wrote that the bridge is made of secular materials: philosophy of science and philosophy of religion, combined into what Barbour and many others have termed critical realism. These secular materials are relatively unaffected by changes in the theories of the scientific community or the doctrines (theories) of the religious communities,

theories that constitute the traffic carried back and forth across the bridge between the two communities. The communities themselves rest on foundations of bedrock. For science, these include the assumptions that underlie and give rise to the empirical method; for Christianity, at least, the foundations include the living encounter with God through worship, scripture, tradition, and reason. But the theories of each community are frequently in flux, as well they should be! I hope that this suggests a somewhat different interpretation of the bridge metaphor, which, like all metaphors, is open to any number of interesting interpretations.

I suggest that theology can in some ways influence the development of themes and offer criteria of theory choice in research science, thus making the relation between theology and science genuinely one of interaction. Drees argues that the pathways from theology to science do not provide any sure “standing” for the theological ideas they start from; even “good intentions may motivate misguided theories.” I agree with Drees here. My point is not that, if a scientific theory is successful, and if it had been inspired by a theological idea, this somehow validates the theology. I only suggest that theology can have cognitive content with empirical import. Drees also argues that “an influence from theology to the sciences can hardly be extrapolated to areas outside cosmology and the most speculative frontiers of theoretical physics.” But in fact the construction of nonrelativistic quantum mechanics circa 1900–1930 involved dozens of outstanding scientists many of whom were known for the ways in which their specific theological and philosophical views influenced their particular approaches to quantum mechanics: Kierkegaard’s influence on Bohr, Vedanta on Schrödinger, Reformed theology on Planck, Spinoza on Einstein, and so forth. Similar stories could be told about the development of neo-Darwinian evolutionary biology, modern mathematics, and so forth.

Drees discusses my insight about levels of design and “many worlds” in the debates over the anthropic principle. Design at the first level, found in the particular set of values of the natural constants that uniquely allow for life, is countered by a many-worlds strategy where all possible values are realized each in a different universe. At the next level up, design is seen in a specific set of laws of nature that allow for life given the right constants, but a many-worlds strategy involving many megauniverses with different kinds of laws of nature undermines it, and so on. He summarizes this correctly by writing that “anything claimed as contingent may well be explained, and thus to some extent necessary, when one gets to a higher theory. . . . Does this show the persistence of contingency or its frailty?” I think Drees is correct that contingency cannot be relied on as a firm basis for a design argument. That is why I am not making a design argument—precisely because *both* contingency as design *and* necessity as “many worlds” show up at *every* level. But *this* fact raises an interesting philosophical question: Why do they both recur like this?

Drees also briefly mentions the series of international research conferences jointly sponsored by the Vatican Observatory and CTNS, and my writings on noninterventionist objective divine action (NIODA) found in the resulting publications. Then he states that “Others have written in some detail about the divine action conferences” before he moves on to other topics. Although this is certainly true, I would value having Drees’s seasoned opinion of the conference series as a whole now that they are completed, particularly because he was a participant in three of them. For example, does he still find a science-informed version of religious naturalism, such as he defended in “Gaps for God?” in the 1993 volume of the series, more persuasive than other views in the series?

Drees devotes considerable attention to my arguments about resurrection and eschatology. Most of what he says seems fair and helpful, but he believes the position I take here “comes closer to a separation of scientific and theological ideas than anything else in Russell’s writings, and thus puts strain on his methodological commitments.” It is true that for many years I wrestled with the challenge from cosmology to eschatology—the predictions for a cosmic future of “freeze or fry.” By the time I published *CAO*, however, I had developed several strategies to keep a “creative mutual interaction” in place so that instead of a conflict with science, theology could benefit from science at precisely the point where the challenge seemed most real. I also found a way for theological concepts to offer potentially fruitful suggestions to science at this same point of interaction. I framed these strategies in terms of “Guidelines” for the ongoing interaction (see *CAO*, pp. 306–8).

In the first Guideline I argue that the challenge is not technically from science but from a philosophical assumption rooted in David Hume and reiterated by Ernst Troeltsch that we routinely bring to science, namely, that the predictions of accepted scientific theories must come to pass. It is quite possible, however, to accept a very different assumption about the predictions of science while accepting what science tells us about the past history of the universe. The alternative assumption is that the laws of nature that science discovers are descriptive, not prescriptive; they describe regularities in nature, not a Platonic realm of laws that nature must “obey.” The second step is to claim on theological grounds that the regularities of natural processes that the laws of nature describe actually result from God’s ongoing action as Creator mediated within and through the processes of nature. Finally, since God is supremely free to act in radically new ways not only in human history but in the ongoing history of the universe, the future of the cosmos need not be what science predicts. Instead, a very different cosmic far future may be in store for us because of a radically new kind of divine action. I believe we have “evidence” for this new act in the bodily resurrection of Jesus. In short we could say that the freeze-or-fry predictions for the cosmological future might have applied had God not

acted in Easter and if God were not to continue to act to bring forth the ongoing eschatological transformation of the universe. Because of Easter and God's promise for its eschatological completion, however, the freeze-or-fry predictions will not come to pass. Still, we must be prepared to reconstruct current work in eschatology in light of contemporary physics and what cosmology tells us about the history of the universe. I refer to this as the construction of a relativistically correct Christian eschatology. In short, where it might have seemed as though a separation between science and theology was inevitable, instead a new and fruitful interaction is thriving.

Drees then addresses the problem of evil (theodicy): "Even if the eschatology envisaged by Russell would be possible, it is doubtful whether the problem of evil would be solved." I entirely agree with Drees: it would not be "solved." What eschatology does, in my view, is provide richer theological resources than the doctrine of creation does to *address* the problem of evil—but this in turn leads to the challenge from scientific cosmology and thus my previous comments about our needing to face this challenge.

CONCLUDING COMMENT

Once again I express my gratitude to my dear colleagues Nancey, Jack, Michael, and Wim for their insightful reviews and for this opportunity to respond. I certainly welcome their supportive and appreciative comments about my work, and I sincerely value the challenges and insights they have raised. I look forward to addressing them more adequately in future research and through it the opportunity for further conversations with them.

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