GOD, DETERMINISM, AND ACTION: PERSPECTIVES FROM PHYSICS

by Gregory R. Peterson

Abstract. Recent articles by Michael Heller, Carl Helrich, Peter Hodgson, Jeffrey Koperski, and Nicholas Saunders present a challenge to much current thinking on God, divine action, and cosmology. In the process, they also reveal underlying assumptions and current problems, especially in the debate over physics and divine action. In particular, three issues come up that need to be addressed further. First, what is the status of determinism, and what can physics contribute? Second, what kind of divine action are we talking about? Third, what is the relationship between God and time, and how does this affect claims about the personhood of God? While these essays present necessary critiques and interesting, positive proposals, they also reveal unresolved tensions that need to be addressed.

Keywords: chaos; cosmology; determinism; divine action; quantum mechanics; time.

A healthy science-theology dialogue is heavily dependent on both the quality of the science and the quality of the theological thinking. The articles by Michael Heller, Carl Helrich, Peter Hodgson, Jeffrey Koperski, and Nicholas Saunders in *Zygon*'s September 2000 issue do a profound service by presenting rigorous and thorough presentations of the science involved in issues of divine action and creation. Collectively, they also raise far more theological and philosophical questions than they resolve. Questions, however, are opportunities in disguise, and the challenges they pose should enrich further dialogue on how we understand the God-world relationship.

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Challenging the Status Quo

It is worth remarking at the outset that the articles on divine action by Helrich, Hodgson, Koperski, and Saunders present a significant challenge to what has become an established area of theology and science dialogue. More specifically, they challenge a set of claims that have achieved a near status quo level. The Center for Theology and the Natural Sciences and the Vatican Observatory have even sponsored a book series on this subject (e.g., Russell, Murphy, and Isham 1997; Russell, Murphy, and Peacocke 1997).

Indeed, quantum mechanics has become a favorite locus for such discussions, since the indeterminacies of measurement seem to provide a natural gap in which God can act. Initially proposed by Robert Russell (1988), this view or variations of it has gained a wide and significant following, including George F. R. Ellis and Nancey Murphy (Murphy and Ellis 1996; Murphy 1997) and Keith Ward (1990). The appeal of quantum mechanics is perhaps understandable, for it appears to be a natural hinge for (in Arthur Peacocke's words) the "causal joint" between God and the world. It is a gap unlikely to close, because it is not produced from our ignorance of science but rather from the character of the scientific theories themselves.

Chaos and complexity theory has also become a staple for discussions of divine action. John Polkinghorne (1996a; 1997), in particular, has argued that chaos theory allows divine action to take place without interference in the laws of the natural order. Because chaos allows very small perturbations to have very large effects, imperceptible input by God can have profound impact on the order of things that we perceive.

Not everyone agrees on these issues. Both Polkinghorne and Ian Barbour criticize Russell's quantum-mechanical model of divine action, albeit for different reasons (Polkinghorne 1997; Barbour 1997). Arthur Peacocke, while not directly criticizing either chaos or quantum-mechanical models, opts instead for a kind of top-down causation (Peacocke 1993). Despite this, it is truly remarkable how little criticism or analysis there has been of what are now rather widespread claims regarding divine action. In recent years, the only persistent critic has been Willem Drees (1997a; 1997b), whose solitary dissent seems to be the exception that proves the rule.

It is in this light that the criticisms of Helrich, Hodgson, Koperski, and Saunders should be taken, for I suspect that they are right. Quantum mechanics and chaos theory cannot bear the heavy load that advocates of divine action place on them. At the same time, the diversity in their presentations and presuppositions suggests that such a dialogue is by no means over. The issues related to quantum mechanics, in particular, rely on interpretations that are not determined by the science alone. There is gold, I believe, to be found in the hills of quantum mechanics and chaos theory, but that gold may be more metaphorical in character than some of the current disputants may be willing to admit.

God, Physics, and Determinism

It is remarkable how much the discussions of science and divine action are bound up with issues of determinism. The hallmark of Newtonian physics was its deterministic character, so much so that there seemed little room for anything more than a "clockmaker" deity. God's options were widely seen to be limited to either a largely passive role as a one-time creator or as an occasional interventionist, violating the established laws of the natural order for a higher, divine purpose. A God who created a natural order only to violate it was repugnant to many Enlightenment thinkers. Thus, Deism became widespread among the elites of the seventeenth and eighteenth centuries.

While Deism fell into disrepute, the Deist emphasis on the inviolability of the natural laws drives the current debate on divine action. Because it is inconceivable that God would choose to violate the laws of nature, some causal joint is deemed necessary. Thus, Saunders cites with approval Polkinghorne's statement that "the last thing that the rational and faithful God can be is a capricious, celestial conjurer" (Saunders 2000, 521). A variation of this position is the stronger claim that, in Einstein's words, "God does not play dice." The natural laws put in place by a rational, faithful God are not only inviolable, they are deterministic as well. This viewpoint is well put by Helrich: "No physical theory can be only statistical and still be regarded as a theory" (2000, 497). Hodgson expresses much the same line of thinking in his advocacy for a deterministic model of quantum events, criticizing Bohr's Copenhagen interpretation as a dissatisfying lack of intellectual nerve. Heller's advocacy of an atemporal doctrine of creation inspired by a proposed noncommutative geometry for the universe seems to presuppose (albeit less clearly) this same position.

At a very basic level, then, arguments regarding physics and divine action are often seen to hinge on two questions: Is the concept of God compatible with a fully deterministic universe? Is God obliged to never suspend the laws of nature? I would add a third: Can physics determine whether or not determinism is true?

I shall address this last question first, as it impinges on how the first two are applied to the science-and-theology dialogue. It seems to be widely held that the status of determinism depends on the interpretation of quantum mechanics. Within the religion-and-science dialogue, Polkinghorne has been clearest in asserting this line of thinking. From his slogan "epistemology follows ontology," Polkinghorne argues that the indeterministic character of quantum measurement implies that the universe itself is indeterministic. Yet, as Saunders' excellent article shows, Polkinghorne's own embrace of indeterminism is not compelled by the science itself. It seems to me that quantum mechanics is ambiguous regarding the issue of determinism. If one gives ontological priority to the act of measurement (as Polkinghorne and many others do), then quantum mechanics seems to

imply an indeterministic and probabilistic reality. If, however, ontological priority is given instead to the deterministic aspects of the theory, such as the wave function, or to possible underlying hidden variables that are fully consistent with the theory (as Helrich and Hodgson do), then quantum mechanics implies determinism. But note that in both cases the reasons given for both determinism and indeterminism are only partially informed by the science itself. Polkinghorne rejects a deterministic interpretation because the implications are so philosophically and theologically unpalatable. Helrich and Hodgson, on the contrary, appeal to broader philosophical notions about the character of science itself.

But even if quantum mechanics were clear on this subject, it seems to me unwise to grant it philosophical and theological finality. Newtonian physics was held to entail a determinism of a very mechanical and predictable kind. Many accepted this deterministic conclusion and struggled to reinterpret theology and philosophy in this light, giving rise to the systems of Baruch Spinoza, Immanuel Kant, and Friedrich Schleiermacher, to name a few. We now know that determinism of the Newtonian sort is dead, and the apparent indeterminism of quantum mechanics has been embraced precisely because it seems to deliver us from Newton's grand machine. But if that is the only lesson we have learned, then we have learned the wrong one; for the primary mistake is to grant the achievements of science in any given period the final say on this issue at all. Science is not metaphysics, and to reify any particular scientific theory is to deny the empirical character of science itself.

Having said this, I believe it is important to acknowledge that while science may not finally determine the issue of determinism, it significantly constrains the available options. Whether or not there are hidden variables and whether or not the indeterminacies of measurement point to a deeper ontological insight, quantum mechanics puts significant constraints on the kinds of things that are possible in the world. It is not the case that "anything goes." Rather, any theory of divine and human action must ultimately take these constraints into account, either by limiting such action, by seeing the creativity of such action within the process itself, or by appealing to the boundedness or limits of the theory that might make room for new grounds of freedom.

Recognizing this, we can now turn back to the second question. Is God obliged to never suspend the laws of nature? The notion that God is at some level bound by physical laws seems to be held by many of the advocates of theories of divine action as well as by their critics. Such a question is most acute for critical realists like Polkinghorne and Peacocke, since they claim that scientific laws are not merely instrumental but are real representations of the world. But what is the status of the laws of nature? In what sense are they laws rather than statistical regularities or limit cases? While these questions should be at the forefront of the discussion of science and

divine action, they are often simply assumed or left to the side. Among the criticisms presented here, only those of Saunders touch on this issue, implicit in his claims regarding divine freedom and the negative assessment of the compatibility of quantum mechanics and divine action. If the "laws" of nature (whether those of quantum mechanics or of chaos theory) are statistical in character or are limit cases, the issue of divine action becomes less acute, for the notion of "violation" disappears. There is indeed order in the universe, but it is an order that permits an unseen depth.

Finally, is God compatible with determinism? I will not attempt to answer this question so much as indicate that it, too, lies at the basis of the debate and these responses. While Saunders emphasizes the freedom of God, Heller proposes a model of the cosmos that seems highly deterministic and implies, as well, a theology that is consonant with this determinism. Simply noting this difference, however, leads to a broader question.

What Kind of Divine Action Are We Talking about, Anyway?

It tends to be assumed in the science-theology dialogue that, while we might disagree on the significance and interpretation of the science and perhaps even specific theories or approaches (e.g., critical realism, top-down action, panentheism), there is a broad general agreement on which theological truths are taken for granted and which are not. Yet, these articles, when considered together with the positions they criticize, suggest that the theological presuppositions may need to be made more explicit. The articles of Helrich, Hodgson, and Koperski primarily confine themselves to scientific critique. That is, their primary aim is to show that the science does not support or only weakly supports the specific theories of divine action proposed by Russell, Murphy, Polkinghorne, and others. However, there is a theological critique that is present as well, one that Hodgson (2000, 514) states explicitly: "It is an impoverished conception of God to suppose that he is bound by his own laws." Quantum mechanics and chaos theory are too constraining for the God who fed the five thousand. In addition to the dispute about the science, there is a potentially significant theological dispute as well.

The Christian tradition has, by and large, affirmed the continuing action of God in the world. This remains true despite the tumultuous fractures that occurred during the Reformation and afterwards. Catholics, Lutherans, Baptists, and Mennonites can all, despite their differences, agree in their rejection of Deism and their affirmation of God's continuing presence and action in the world. At the same time, these different traditions tend to emphasize different kinds of action. Most Protestants give little credence to miracles attributed to Catholic saints. Quakers are more likely than Presbyterians to emphasize the role of religious experience. Evangelicals

affirm faith healings, while Pentecostals affirm (and indeed require) a baptism in the Spirit that confers gifts such as the speaking in tongues. A good Calvinist will speak of God's providence, while a Lutheran might be more likely to invoke the *deus absconditus*, the hidden face of God. Some years ago, a televangelist claimed that his prayer campaign influenced the course of a hurricane, causing it to veer away from the Atlantic coast of the United States, thus saving life and property. Does God do hurricanes? And if so, when?

These differences among denominations are not hard and fast. There are Calvinists who visit faith healers, and there are Lutherans who have personal religious experiences. But they do reveal the range of claims that are made on behalf of divine action, and to some extent they reflect real theological differences between traditions. The Calvinist tradition provides for a strong doctrine of providence that has traditionally emphasized the guiding role that God plays in one's life without (apparent) need of direct intervention. The Catholic tradition of miracles is tied to its unique understanding of sainthood, which in turn is tied to its understanding of the sacraments and the Christian life. These differences may also be tied to differing understandings of God. Someone who emphasizes a kenotic doctrine of God will be less likely to appeal to God's "mighty acts" than will someone who is strongly informed by the Deuteronomistic history, which sees God as the ruler and judge of nations. The God of process theology who acts only by means of persuasion (an option surprisingly little talked about in science-and-theology circles) is very different from the God of Intelligent Design, who is directly responsible for all "irreducible complexity."

To wit, the theology in this discussion matters as much as the science, and the theology needs to be more explicit. It is not enough to find a way that God can act in the world. We must be clear as to what kinds of action we are talking about. Until we do so, we do not have a theory of divine action; we have only a theory of the possibility of divine action. While some may claim that such issues are beyond the domain of the science-religion dialogue, a good case can be made that precisely the opposite is true. The kinds of divine action that are conceivable in a scientific age is precisely the sort of topic that should be engaged.

In his book *Hellfire and Lightning Rods*, Frederick Ferré (1994) recounts a childhood experience that indicates one direction such a dialogue can go. During his father's tenure as a minister in rural Minnesota, the issue came up of whether to put a lightning rod on the roof. To do so, it was argued, would show a lack of faith in God's providence. Yet, the science of the day clearly indicated the beneficial power of lightning rods. Lightning is not simply a matter of God's will, as was commonly believed, but a physical event understood in terms of charge and current. Only a fool would test God's will by *not* putting a lightning rod up!

While this tale may strike some as dealing more with Midwestern popular piety and superstition, the issues present seem to appear in many claims about divine action. What kind of divine action is conceivable, when does divine action occur, and how do we know when it occurs? A more powerful challenge to this kind of thinking is present in Richard Dawkins's *Unweaving the Rainbow* (1998). Dawkins observes that God or other forces (often paranormal) are invoked to explain extremely improbable events, without regard for the fact that improbable events must, statistically speaking, happen to *someone*. Every year planes crash in the world. In every serious plane crash, people die. Occasionally, some live through the ordeal. Did they survive by chance or by divine intervention, and how can we tell? Survivors of natural disasters, car crashes, and severe medical conditions frequently ascribe their survival to divine intervention. All of these events can also be given statistical explanations. If this is the case, however, to what extent should we ascribe such improbable and seemingly fortuitous events to God?

Some of these questions are addressed, but mostly indirectly. The criticisms of Saunders and Hodgson stem in part from their adherence to a robust understanding of divine action, yet it is unclear exactly what range of action they are envisioning. Both advocates and critics of divine action need to deal with these issues more directly, for they lie at the implicit center of the debate.

God, Time, and Action

Heller's article is so different from the others, both in topic and tone, that it merits separate treatment, not least because it helps shed some light on the other papers. Theologians, in their encounter with science, often take one of two approaches. In one approach, theologians ask the question: "Given that science *x* (quantum physics, evolutionary theory) is true, how does this affect traditional theological claims?" In the other approach, a different question is asked: "How can new or current scientific insights serve as models or metaphors for understanding theological claims?" It is notable that much of the work done on divine action takes the first route. Given that quantum theory and chaos are true in a concrete sense, to what extent is divine action still possible?

Heller, however, takes the latter approach. The significance of cosmology does not lie in its concrete claims. For Heller, it matters little for theology whether cosmologists such as Stephen Hawking support a temporal origin for the universe or not. Indeed, as a physicist, Heller would prefer to do away with singularities and a temporal origin altogether, a move that puts him at odds with Robert Russell (1996). Instead, the significance of science lies in its metaphoric potential. The noncommutative geometries being considered in cosmology open up a way of seeing God as

both atemporal and dynamic. In this approach, science does not put constraints on God's action but rather serves to re-vision our understanding of God.

While the theological differences may not be as great as they appear, the difference in tone between Heller and the other articles is striking. Both Saunders and Hodgson, despite other differences, affirm the freedom of God to act, a kind of freedom that seems to imply a strong involvement in the temporal order. While Heller does not deny this sort of freedom, it does seem harder to conceive when linked to a cosmic, atemporal deity. What does freedom mean in an atemporal framework?

It is fascinating to note that these different emphases may be due to the different dialogue partners. Discussions about quantum mechanics and chaos theory naturally seem to bring up issues of divine action and whether or not there is "room for God." Discussions surrounding cosmology naturally bring up issues of origins, time, and God's action as a whole. Yet, each is equally distant in scale from the human experience; the world of the unfathomably small is as remote as that of the unfathomably large. For Christians, however, God must nevertheless be lord of all.

Usually, this realization results in a focus on the issue of immanence and transcendence, a point Heller acknowledges (2000, 683). It also calls up questions about the personhood of God, which again contrasts with the tone of argumentation present in the divine action debate. Both proponents and critics of divine action in quantum mechanics and chaos theory tend to assume a strongly personal God who acts intentionally. The significance of divine action is seen not in its unusual, even miraculous quality but in its claim that certain kinds of events have a higher purpose conceived in intentional terms. God loves us, God cares, and God acts to reward, to teach, and even to punish. But if God is atemporal, in what sense is such language meaningful? Can God love atemporally? What, then, would be the meaning of the Incarnation?

I pose these questions not to claim that there are no conceivable answers but to show the different theological intuitions present. There is, I would suggest, a profound ambivalence in the science-theology dialogue regarding the personal language used of God. While John Polkinghorne strongly endorses personal language, Arthur Peacocke speaks of personal language being the "least misleading" to describe the reality of God (Polkinghorne 1996b; Peacocke 1993). Process theology's dipolar approach may serve to bridge this gap, but I believe that more conscious reflection needs to take place on this issue.

Unconcluding Remarks

The dream of a final theory has haunted physics for several decades now. A similar dream sometimes haunts the religion-and-science dialogue as

well, suggesting that the dialogue is about finding a solution, the grand metaphysical key that will unite science and religion in a final, exuberant embrace. I would suggest, however, that we need to think dynamically, embracing mutual criticism as the necessary step to deeper, broader insights. In this light, criticisms of theories of divine action and theological cosmology play a necessary role, requiring better and more sophisticated responses and alternatives. It is in the process of give and take that new ideas emerge. And, sometimes, the journey is as important as the destination.

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