

# **DIVINE ACTION: AN INTERVIEW WITH JOHN POLKINGHORNE**

by Lyndon F. Harris

*"Epistemology models ontology." Polkinghorne's wife heard him say it so often that she gave him a sweatshirt with the slogan inscribed upon it.*

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Recently, the *New York Times* reported that 40 percent of American scientists believe in a personal God to whom they pray. A British scientist of similar belief is John Polkinghorne. Serving for twenty-five years as Professor of Mathematical Physics at Cambridge, Polkinghorne distinguished himself in the field of elementary particle physics and in 1974 was named as a Fellow of the Royal Society.

However, just five years later, in 1979, Polkinghorne made a significant career change. Giving up a lucrative teaching appointment, he again became a student, applying himself to the study of theology. Having published numerous books and articles in the fields of science and theology, Polkinghorne has emerged as one of the world's leading thinkers attempting to correlate the conundrums of quantum physics with the mysteries of the Christian faith.

The following interview took place at The General Theological Seminary in New York City, where Professor Polkinghorne was a visiting lecturer in the Spring of 1997. It is an attempt to explore and clarify some of the pressing issues in the science/theology debate.

**LH:** Professor Polkinghorne, during a distinguished career as Professor of Mathematical Physics at Cambridge University, you made a significant contribution to the field of elementary particle physics. Then, in 1979, you resigned your position in order to train for the priesthood in the Church of England. Would you please comment upon this transition?

**JP:** I very much enjoyed my career in science. I didn't leave science because I was disillusioned, but felt I'd done my bit for it after about twenty-five years. I was very much on the mathematical side, where you probably do your best work before you're forty-five. Having passed that significant date, I thought I would do something else. Since Christianity had always been central to my life, the idea of testing my vocation and seeking ordination seemed a suitable second career.

**LH:** And you've spent some time in the parish as well?

**JP:** Yes, I was a parish priest for five years. I was a curate in a large working class parish in Bristol and the Vicar of a village in Kent.

**LH:** Then the academy lured you back as president of Queens' College, Cambridge. Your background in science gives you a special vantage point from which to do theology, an approach that you've described as

"bottom up thinking." Please explain that phrase, and why you think this methodological commitment is important for theology.

**JP:** Bottom up thinkers try to start from experience and move from experience to understanding. They don't start with certain general principles they think beforehand are likely to be true; they just hope to find out what reality is like. If the experience of science teaches anything, it's that the world is very strange and surprising. The many revolutions in science have certainly shown that. If that's true of our encounter with the physical world, it's likely to be even truer of our encounter with God.

**LH:** In the April 1997 issue of *Theology Today*, you are described as a process theologian but you have stated clearly that you are not. What are the major differences between your thinking and process theology?

**JP:** I think there are two major differences: one is in relation to the metaphysics of process thought, which is Whitehead's event-dominated picture of reality, the idea that the fundamental unit is the event. That's a very punctuated "point line" way of thinking about the world, and it doesn't seem to me to fit in with the modern science's account of physical process. There are, of course, discontinuities in quantum theory, for example, where measurement takes place; but most of the time there is, in fact, a continuous process. So Whitehead's metaphysics doesn't fit very well on to physics as we understand the process of the world.

The second difficulty is a theological one, that the God of process thought is very much a God who is a persuader, a party to everything that happens, but who doesn't really bring about anything that happens; He's simply trying to lure the world in a particular direction. And I think that such pleading on the margins doesn't give a strong enough picture of God's relationship to created reality to make God the ground of hope, or to give an account of God as the Father of our Lord Jesus Christ, who raised Jesus from the dead.

**LH:** How, then, is it that sometimes you are mistaken for a process thinker?

**JP:** Well, it's because I gladly acknowledge some ideas that are part of process theology, but which I think are not tied to all the details of process thought, and are very illuminating and helpful. Whitehead reacted strongly against the idea of God as a cosmic tyrant, one who brings about everything. I believe that God allows the world to be itself, but not to the point of simply being a persuader of the process of the world. A picture of God halfway between tight control of everything, and just a deistic spectator -- that's the thing that's worth working for. I share that goal with the process theologians, but I want to achieve it in a different way. Another idea I find helpful is to take God's involvement with time very seriously. We speak of God as having both an eternal pole and a temporal pole, so that God is truly engaged with the process of the world and not just detached from it. I find that a very helpful thought, as have many twentieth-century theologians who wouldn't describe themselves as process thinkers.

**LH:** Owen Thomas depicted you as a process thinker because of your concept "dual aspect monism." Would you briefly explain this?

**JP:** "Dual aspect monism" is an attempt to wrestle with the persistent unsolved problem of how mind and matter relate to each other. It differs from classical dualism, which maintains that there are two sorts of substance: mind and matter. Its problem was how they relate to each other. I'm sure that we're not simply matter, and I'm sure that reality is more than just ideas. None of the classical solutions seem to correspond to our experience. Dual aspect monism tries to take seriously both our mental experience and our material experience. It says that they're related to each other in a very deep and complementary way, that there is only one stuff in the world. Dual aspect monism seeks to avoid devaluing or subordinating one side or the other. Sometimes it might seem a little like a subtle form of materialism, but I don't think it is, because it doesn't treat the mental as being just an epiphenomenon of the material.

**LH:** You've also expressed a deep appreciation for what Teilhard de Chardin accomplished in his career, but you differ from him as well. Whereas Teilhard understood the present world to be panentheistic, you prefer to speak of the world to come as panentheistic. Would you care to address this difference?

**JP:** Yes. Let me say first of all that I admire Teilhard as someone of integrity who sought to hold together his science and his religious experience, but the details of how he did it don't correspond to how I would try to do it myself. I think it's very important to maintain the classical Christian distinction between the Creator and creation. Of course, we don't want the rather remote God of classical theology who was much too transcendent and whose immanence was really rather understated. We want an even-handed balance between transcendence and immanence, but I think the distinction between Creator and creation remains crucial for two reasons. One is that, if we don't, the problem with evil, and God's relation to evil, becomes more intense. And secondly, a God who is too caught up with creation cannot be the ground of hope for a destiny beyond death both for creatures and the whole of creation.

I believe that God created this world, this creation, to be other than God's self and that it is allowed to be itself. However, as the Eastern churches have always maintained, through Christ creation is intended eventually to share in the life of God, the life of divine nature. Even now, this world contains sacraments, inklings of God's new creation, the redemption of this world beyond its death. I believe that the new creation will be a totally sacramental world, totally suffused with God's presence. That means, of course, that the world could *then* properly be described as panentheistic. So I see panentheism as an eschatological destiny rather than as a present reality.

**LH:** Let's turn to the subject of cosmology. There's a great deal in the literature, particularly in such writers as Thomas Torrance, about the extraordinary revolution presently taking place in human understanding, the shift from a Newtonian to an Einsteinian cosmology. What are the underlying issues, taking into consideration the shift from the dualistic thinking of Descartes and Newton to the present understanding of reality as one?

**JP:** I think three important things have happened. One is certainly associated with Einstein, the recognition of the relational character of reality. The Newtonian picture was that space was there as a sort of container, and there were little independent particles that whizzed around and banged into each other. That picture has been replaced by a unified understanding, derived from Einstein's general theory of relativity, that space and time and matter are all linked together, so that the world is relational in that sense. That is a very important development, and many theologians have seen in it a suggestion of the relational thinking of a trinitarian theology.

Then there's been a second revolution, the discovery of quantum theory, which has brought about a number of changes in our thinking about the world. First, the world is no longer tightly deterministic and mechanical; there is a probabilistic character to physical process. And, of course, quantum theory also has its own relational character. Once two quantum entities interact with each other, they retain a very surprising and counterintuitive power to influence each other, however far they separate. Quantum theory also tells us that the world is not simply objective; somehow it's something more subtle than that. In some sense it is veiled from us, but it has a structure that we can understand.

A third change in our picture of the physical world is in terms of everyday physical processes -- the so-called chaos theory has told us that intrinsic unpredictability, nonmechanical behavior is characteristic, not just of quantum theory in the subatomic roots of the world, but also of its everyday process. There are clouds as well as clocks around in the physical universe, and that means that the behavior of these systems relies in a sort of oxymoronic combination of order and disorder -- "on the edge of chaos," as people sometimes say -- halfway between a totally rigid world that would be sterile because nothing really would change in it, and a totally random world which would be sterile because it would be completely haphazard. In between, in the balanced interplay between a degree of order and a degree of openness, is the fruitfulness of this universe.

**LH:** Splendid. Does this correlate with chance and necessity?

**JP:** Absolutely. Another way of expressing this is the description of an evolving world as due to the interplay between chance and necessity. Chance doesn't mean meaningless randomness, but historical

contingency. This happens rather than that, and that's the way that novelty, new things, come about. On the other hand, these new things would just disappear if they weren't preserved by a degree of lawful regularity in the world.

**LH:** And both of those are essential early on in creation.

**JP:** Yes, they are essential early on, and throughout. Evolution, of course, is not something that simply applies to life here on earth; it applies to the whole universe. After all, the universe required ten billion years of evolution before life was even possible; the evolution of the stars and the evolving of new chemical elements in the nuclear furnaces of the stars were indispensable prerequisites for the generation of life. The laws that we understand as laws of nature had to be finely tuned to make this possible. The physical fabric of the world had to be such as to enable that ten billion year preliminary evolution to produce the raw materials of life. Without it there would not have been the chemical materials to allow life to evolve here on earth.

**LH:** I'd like to read a quotation from Thomas Torrance's *Theology and Reconciliation*, regarding the epistemological shift from Newton to the present:

A very serious problem faces us today, that of the time lag between the inception of the revolution of foundations of thought and the completion in the restructuring of our forms of thought and life. For the transitional period is full of chaotic ideas, paranoid anxieties, hybrid solutions and regressive tendencies. (270-71)

Torrance declares that "we have difficulty making this shift because we are committed to the science of the eighteenth and nineteenth centuries." Do you have any ideas about how we might navigate these confusing seas?

**JP:** Tom Torrance is a major theologian who throughout his career has sought to take the insights of science seriously as part of his theological thinking. I think he's absolutely right in that quotation. Many people have a very outdated picture of what science tells us about the world. They think of it as a clockwork world; the sort of universe that Laplace talked about at the end of the eighteenth century -- his notorious statement that if a calculating demon knew everything that is happening now, that demon could predict the total future and retrodict the whole of the past. That certainly was the idea of physical process then, but it's not now. The universe is more open, more subtle, and more supple in its character than people in the eighteenth or nineteenth century could know. Unfortunately, this hasn't really permeated a great deal of theological thinking. People, and especially theologians, should try to familiarize themselves with scientific ideas. Of course, science is technical in many respects, but there are some very good books that try to set out some of the conceptual structure of science. These include Paul Davies' *Superforce* [Heinemann Publishing] and *About Time* [Viking Press], as well as James Gleick's *Chaos* [Heinemann Publishing], and my own *The Quantum World* [Princeton University Press].

**LH:** Related to this, in *Reason and Reality*, you quote the philosopher and physicist Bernard d'Espagnat who is convinced that philosophy must learn from the sciences, particularly physics: "we may imagine that to reach the truth, we only need to come up with brilliant ideas, but that is mistaken, for it remains illusory to hope that in our day people can still make valid claims on matters such as reality, time and causality, if these claims are not rooted in the extraordinarily elaborate, factual knowledge now at our disposal" (44).

In view of this, why is it that many theologians view this science/ theology conversation as a specialty rather than seeing it as fundamental to doing theology today?

**JP:** Theologians have a great problem because they're seeking to speak about God. Since God is the ground of everything that is, there's a sense in which every human inquiry is grist to the theological mill. Obviously, no theologian can know everything. On the other hand, the nature of the physical world and nature of the history of the physical world are important factors. Those theologians who are beginning to

take the doctrine of creation very seriously should pay some attention to science's story. At present, too much theological thinking is very human-centered. Of course, nobody would deny the importance of human beings for theological thinking, but the time span of history that theologians think about is a few thousand years of human culture rather than the fifteen billion years of the history of the universe. And the scale on which they think is also parochial. When they say "the world" they usually mean our planet earth, rather than the one hundred thousand million galaxies of the observable universe. They should enlarge their horizons.

**LH:** One who was deeply committed to the Einstein revolution and quantum physics is Michael Polanyi, a chemist and a philosopher of science. What do you think is the most attractive facet of his approach?

**JP:** What I find most helpful about Polanyi is that he describes himself as being postliberal. We could probably use the word postmodern today. He recognizes that the great Cartesian program of clear and certain ideas, of foundational knowledge true beyond the possibility of doubt, is unattainable. Yet he is not driven by that to a relativism which simply says, you have your opinions, I have mine. He seeks to find a middle way between the two, greatly aided by his experience of science, where he also recognizes that there is a certain precariousness in human knowledge. Understanding, he insists, requires a commitment to a point of view; one's point of view should be open to consideration, but nevertheless, through our acts of commitment, we have powers of understanding which enable us to make progress in gaining knowledge of the physical world. He wrote his great book, *Personal Knowledge*, to show how it was possible to commit yourself to a point of view, while knowing that it might be wrong. I find that a very recognizable description of the scientific enterprise. I also agree that the scientific enterprise is successful, and this encourages me to think that Polanyi's stance is one that's actually sustainable. And if it's sustainable within our investigation of the physical world, that is an encouragement also for other forms of human inquiry including theology, where to an even greater degree, we have to commit ourselves to a point of view, and where we know our ideas are going to be only partially adequate. Polanyi's stance is a very helpful way of steering a middle course between thinking that you can prove things in some logically decisive way, and thinking there is no truth to be found or knowledge to be gained.

**LH:** His vantage point seems helpful in doing theology in what we have referred to as a postmodern period.

**JP:** I think so. His ideas are one way of articulating what we often call "critical realism," both in relation to science and also in relation to theology. If you think about it, Rahner's Rule, which says that "the economic trinity is the immanent trinity," is a statement of theological realism, that what we know about God is not misleading. In other words, the economic trinity *is* the essential trinity; what we know about God is a reliable guide to the divine nature.

**LH:** You have stated that "rather than being the first of the new scientists, Einstein is really one of the last of the ancients." What do you mean by this?

**JP:** Of course, Einstein was a very great scientist indeed, and I have enormous respect for him, and great admiration for the discoveries he made. But he was very committed to a view of the objectivity of the physical world. He wanted the physical world to be picturable, wanted it to be deterministic, and he wanted these things, I think, because he believed those qualities would guarantee the reality of the physical world. Like all scientists, Einstein believed very passionately in the reality of the physical world, and that we really learn something of its nature in our scientific investigations. I share that view with him, but I don't think that means we have to commit ourselves to a purely objective view of the physical world in the classical sense. It's clear to me that quantum theory (a theory that Einstein hated and never truly accepted), shows us that the world is more subtle, more veiled than that. Nevertheless, all of us who work in quantum physics believe in the reality of a quantum world, and the reality of quantum entities like protons and electrons. The basic reason we believe this is not because they are objective in the classical sense -- because they're not -- but because the supposition of their existence enables us to understand, to a great extent, physical experience. Thus, intelligibility is the guarantee of reality, rather than of objectivity. Incidentally, that was very powerfully and persuasively put forward by Bernard Lonergan.

**LH:** Would you say a few words about Paul Dirac, his discovery of the positron, and the development of quantum physics?

**JP:** I learnt my quantum mechanics from Dirac, who was one of the founding fathers of the subject, a sort of scientific saint. He had both great singleness of mind and great humility. He made very significant discoveries through the pursuit of beautiful equations, but never emphasized his own part in them or attached his own name to them. One of the fascinating things about the physical world is that its fundamental structure seems always to be expressed in beautiful mathematics. To me that suggests that there is a Mind behind the structure of the world, and that our minds are somehow attuned to that Mind. One of the great minds of physics in the twentieth century, Dirac was not a conventionally religious person at all. In his youth he was rather opposed to religion, but became more understanding -- though not exactly accepting -- of it in later life. He was once asked what were his fundamental beliefs and he turned to a blackboard and wrote "The equations of physics are expressed in beautiful mathematics." It was the relentless pursuit of that mathematical beauty that led to his great discoveries. He discovered antimatter, and how to put quantum mechanics and relativity together.

**LH:** Dr. Polkinghorne, you have often expressed your fondness for a particular phrase, "epistemology models ontology." Would you please say a few words about it?

**JP:** I coined the phrase, and my wife heard me say it so often that she gave me a sweatshirt with the slogan inscribed upon it. For me the phrase is a succinct statement of a realistic view of the scientific enterprise, or indeed, of the wider human inquiry into reality: that what we know is a reliable guide to what is the case. We are not misled by the world. I don't accept the Kantian disjunction between phenomena (things as we know them) and noumena (things as they are in themselves). The whole effect of scientific experience is to engender belief that we attain a tightening grasp of an actual reality. Of course, we make maps of the world, rather than totally describe it; there is always more to learn. My slogan is just a way of saying that we are not misled by our encounter with reality. How it appears to us, how we get to know it, is a reliable guide to reality's nature. The idea comes out of my experience as a scientist, but I think it's underwritten by the world being the creation of God, for God is not a deceiving demon in a Cartesian sense. It is the faithfulness of God that allows epistemology to model ontology.

**LH:** Do different epistemologies have a relationship of verisimilitude? Perhaps it would be helpful if you discussed the relationship of consonance and assimilation.

**JP:** I'm a very passionate believer in the unity of knowledge. There is one world of reality -- one world of our experience that we're seeking to describe. Of course, there are different aspects and levels of that reality; we can encounter the same event in a different way. We could describe it in very physical terms, or as a carrier of beauty, or a moment of moral choice; it could be the moment we encounter God. There are these different layers. But somewhere they've all got to fit together. I want to put them together in a way that respects the different characters of each level that I experience, as well as the fact that the experience is of one reality. I want a consonant relationship, for example, between science and theology. Science cannot tell theology how to construct a doctrine of creation, but you can't construct a doctrine of creation without taking account of the age of the universe and the evolutionary character of cosmic history. I also think we need to maintain distinctions -- the doctrine of creation is different from a scientific cosmology, and we should resist the temptation, which sometimes scientists give in to, to try to assimilate the concepts of theology to the concepts of science. There is a distinction that needs to be maintained.

**LH:** Can a scientist pray?

**JP:** Well, that depends on what you mean by prayer. Scientists, I think, very often pray without knowing they're praying. A sense of wonder at the beauty and fruitfulness of the world is a very common scientific experience. Actually, that's a sort of tacit prayer of adoration to the Creator, but of course many of my scientific friends wouldn't be able to see it that way. I suppose the real point of the question, "Can a scientist pray?" is in terms of petitionary prayer: can we actually ask God for something? I think we've

come to see a picture of the physical world that is open, is subtle and supple. We're beginning to see a picture of the physical world in which we can understand ourselves as its inhabitants, because we know we have powers to act in the world; hence the world must really be open for us to act within it. It seems to me likely also to be open to God to act within it. In other words, God's providential interaction with history is not ruled out by what we know about scientific process.

**LH:** In one of your writings you use a curious phrase, "liturgy-assisted logic." What do you mean by it?

**JP:** It's a transmutation of a phrase I took from physicist David Park. He was talking about how science understands the world, but needs the nudge of nature to see exactly what the pattern and structure of that world is. Often the true pattern of the world is very much more interesting than we could imagine beforehand. David called that nature-assisted logic. And it seems to me that a lot of our theological thinking is "liturgy-assisted logic" in this sense: I think one of the fundamental religious experiences is the experience of worship. I'm not a person who has had any overwhelming numinous experience or deep mystical experience. I do have an everyday sort of experience of worship and prayer. In fact, my spiritual life is sustained by things like the daily office that I say as a priest, and the eucharistic worship of the Church. It's that experience, I think, which helps us in our thinking about God.

**LH:** Do you have any final comments about the future of the science/theology debate?

**JP:** What I'd like to say about that is that the debate is continuing. The most discussed topic at the moment is divine action, and that is a sign that the encounter between science and theology is becoming closer. We're not simply talking about creation and natural theology (important issues though they are); the two disciplines are engaging each other in perhaps more central questions, which will continue and expand. Indeed, I think the conversation needs to be greatly extended. We need more theologians prepared to participate in it; we need also a wider range of scientists. A great deal has been done by physical scientists; we need more biologists. And above all, we need more people from the human sciences. My colleague at Cambridge, Fraser Watts, Starbridge Lecturer in Theology and the Natural Sciences, holds the first endowed position in the field of science and theology in Britain. His scientific background is in psychology, and I'm sure some important consequences will flow from that.

**LH:** Professor Polkinghorne, thank you very much for the pleasure of this interview.

**JP:** Thank you, Lyndon. I very much enjoyed the conversation.

### **Books by John Polkinghorne**

- *The Faith of a Physicist: Reflections of a Bottom-Up Thinker*. Minneapolis: Fortress Press, 1996. One of the best introductions to Polkinghorne's thought on classical Christian doctrines, this publication is the collection of his 1993-94 Gifford Lectures. Polkinghorne sets before himself the monumental task of exploring the Nicene Creed from the point of view of a scientist (i.e., a "bottom-up thinker").
- *The Quantum World*. Princeton: Princeton University Press, 1985. This concise volume offers an excellent introduction to quantum theory for the general reader. Polkinghorne here offers helpful instruction on the basics of quantum mechanics.
- *Quarks, Chaos and Christianity: Questions to Science and Religion*. New York: Crossroad Publishing Company, 1996. This is an introduction to the major questions arising from the dialogue between science and theology. Polkinghorne grapples with such engaging questions as "Is anyone out there?" "Can a scientist pray?" "What about miracles?" and "How will it end?"
- *Reason and Reality: The Relationship Between Science and Theology*. Valley Forge, Pa.: Trinity Press International, 1991. This volume offers a more detailed account of Polkinghorne's unique vantage point in the science/theology debate, engaging topics such as "Rational Inquiry," "Reason and Revelation," "The Use of Scripture," and "The Fall." Particularly illuminating is his discussion

- of "The Fall" from a scientific perspective, considering critically the difficulties associated with the popular traditional belief that a radical change occurred because of a grievous ancestral act.
- *Scientists as Theologians: A Comparison of the Writings of Ian Barbour, Arthur Peacocke, and John Polkinghorne*. London: SPCK, 1996. While it should come as no surprise as to which of the above-mentioned authors Polkinghorne prefers, this volume is most helpful in comparing three leading "scientist-theologians." Polkinghorne honestly assesses both the contributions and inadequacies of each. Helpful here is his location of each of the three on a "consonance-assimilation" spectrum -- "consonance" being the perspective that science and theology have similar interests, but remain separate disciplines; and, "assimilation" being the point of view in which science and theology are completely integrated into one discipline.

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