

Polkinghorne on Metaphysics of Divine Action: Presuppositions and Implications

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Abstract

This article is an effort to evaluate the epistemological and ontological presuppositions of John Polkinghorne's interpretation of the mechanism of God's special action. Briefly, it can be said that in his view, God forms and models the world's processes with His act of injecting pure active information, but neither determines nor devolves them to energetic causality. His formulation is based on some presuppositions, such as a personal account of God, seeing the world as a chaotic system, ontological monism, and a critical realist approach in epistemology. The article has tried to answer four main questions: Is Polkinghorne's formulation of divine action based on a mere iteration of the god of deism? Is his formulation of divine action a mere pointless rework of a causal system which rules the world? Does this interpretation of divine activity mean divine intervention? And is his formulation an iteration of natural theology?

Keywords: Divine action, Informational causality, Chaotic system, Physical causal closure, Critical realism.

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Introduction

Humankind is used to natural causes of natural events—indeed along with some situations in which there are seemingly unfillable gaps between these causes and effects. Such situations can be described as fluctuated situations, in which these gaps are sometimes more than regulations and sometimes less. But the least natural causation in events, on the one hand, and a kind of belief in a personal God like the God of Abrahamic religions, on the other hand, are enough for a dilemma to emerge: what is the relation between divine agency and natural causation? Even one case of natural causality is enough to raise this question: who is the true agent, God or something/one other than Him? If the response is the latter, God’s agency and its most crucial feature, i.e., totality, are contravened, and if the answer is God, it is a steppingstone to some further questions: what is the very meaning of divine action, and how can these two causes—God as the transcendent cause of a given event and the natural cause of that event—be related to each other simultaneously?

Historically, one of the most well-known answers to all these problems is based on a differentiation between horizontal and vertical causal relations: supposing God’s agency vertically and natural causes horizontally related to the effects. In another formulation, the differentiation between real and occasional causes is proposed: considering God the one and only true cause of everything and so forth. Alongside these classical responses to the problem of divine action, some contemporary philosopher-scientists like John Polkinghorne (2009) and Arthur Peacocke (2000) have tried to suggest novel revisions and re-formulations of the problem in light of sciences such as physics, biology, and chemistry, and the advanced contemporary understanding of nature and its mechanisms (see Polkinghorne 1996, 26-41). In this article, we investigate the presuppositions and some

philosophical and theological implications of one of these formulations, which has been put forward by John Polkinghorne. It can be said briefly that, in his view, God forms and models the world's processes with the act of injecting pure active information, but neither determines comprehensively nor devolves them to energetic causality.

Polkinghorne's Formulation of Divine Action

To formulate divine action, three points must be explained: (1) our imagination of God, (2) our imagination of the world, and (3) the quality of their relationship, that is, how God affects the world. Every possible formulation of divine action owes its coherence to these three constituent parts. In this section, these points will be discussed.

God

Polkinghorne believes in God as introduced in Scripture. He explicitly rejects the god of natural theology, process theology, and even the god of deism, and admittedly has a strong faith in the attributes and actions of the God of Scripture. Based on his analysis, if we are not to believe merely in the God of natural theology and insist unequivocally on the God of Abrahamic religions, then we cannot be satisfied with natural theology's description of divine action and ought to look for a new one. The God of Scripture, unlike the god of deism, is personal and cannot be imagined without any peculiar activity in the world. "God is personal," Polkinghorne says "and such a language must surely imply that God is active, doing particular things on particular occasions and not just functioning as an unchanging effect like the law of gravity" (Polkinghorne 2000, 105).

If it is said that God must be personal, then we ought to admit that He is concerned about His creation and is involved in its history and guides it; this is the insight one can obtain from the Bible about God

and His actions. God, thus, has some special actions, preserves the world in the realm of existence, and gives it order, and to Him all actions are attributed. On the other hand, Polkinghorne quotes Kasper as saying, “The God who no longer plays an active role in the world is in the final analysis a dead God” (Polkinghorne 2005, 48-49). Nietzsche, also, has declared that God is dead (possibly, the god of modernity); surely, this doleful confession is due to the fact that a god who acts only like the law of gravity and is an impersonal god without any relation to, or concern about, His own created world, which fully resembles Him, deserves death.

The World

Polkinghorne’s account of the world is a result of two factors, which he regards as complementary: religion and science. In this section, we will discuss the role of science, and we will discuss the role of religion later. It can be argued that all different branches of science, which collaborate in describing the world, reveal common characteristics, especially sciences such as physics, biology, and chemistry. Demolishing the mechanical, determined picture of the world and replacing it with a dynamic, open-ended picture might be claimed to be the most crucial similarity between them.

In Polkinghorne’s view, the classical modern picture of the world, which he calls the Newtonian world, cannot be defensible, due to the insights of the science of the twentieth century (Polkinghorne 2005, 4). In a world in which everything is pre-determined, where there is no room for any out-of-agenda activity, in a world similar to a solid glass bead whose inhabitants are not able to make the least movement, free will is nothing but a worthless fiction.

Now, here, let’s imagine that solid glass bead as everything that *is*, which means its creator is one of the inhabitants and this everything

bead contains its own creator. In this case, the creator himself does not understand anything, even a word, about freedom or free will, which makes him nothing more than a background law, something like the law of gravity, which is condemned to necessity by itself. This predominant necessity, like an eternal frozen winter not followed by a warm summer sun, was taken from the insights of pre-twentieth century science, but it is not consistent at all with the God of Abrahamic religions. It can be stated that these regulations are derived from God's care, economy, and reliability, but one should be aware that over-insisting on one attitude (God's economy) and forgetting comprehensively the other (God's acquiescence), would not just result in neglecting the second one but also in misunderstanding and consequently neglecting even the first one (Polkinghorne 2005, 12).

Polkinghorne sees the contemporary astrophysics, quantum mechanics, evolutionary biology, and new geology as sciences which explicitly controvert a static and determined picture of the world; on the other hand, he thinks of the world as a chaotic system, an insight indebted to thermodynamic physics and gas behavior. It might also be declared that chaos theory is derived from generalization of some chaotic systems to the world as a whole, notably a valid generalization (Polkinghorne 2005, 122).

A chaotic system is one without precise and predictable behavior in its future. It does not mean, indeed, that there are unlimited possibilities before the system to choose from. In other words, chaotic does not mean absolutely chaotic; it means not absolutely determined. A chaotic system is somehow, not absolutely, predictable or pre-determined (Polkinghorne 2000, 99-101). It might be argued that the large majority of physicists believe in chaotic systems as

unpredictable but determined. Polkinghorne is totally against this idea, holding that “not being predictable” is a sign of “not being determined.” This is, undoubtedly, a metaphysical conclusion, not a physical one; that is, although so many physicists, meditating on chaotic equations, look at the world in a deterministic way, Polkinghorne, looking at exactly the same equations, understands them non-deterministically. The equations are silent, and what speaks is people’s metaphysical decisions. It means that although one is against the mainstream, when we face equations (which are somehow intrinsically silent and just constraining), a limited range of metaphysical interpretations are possible.

Having this feature makes a system open to the future; that is, its future is not engraved in its past. This openness is what Polkinghorne intelligently uses the most in describing the quality of divine action. Another important point about chaotic systems is that they are incredibly sensitive to environmental changes such that these changes have absolutely strong effects on them, because their internal laws are not enough for ruling the system. This feature co-exists with not being completely predictable. When a system is not completely predictable, which means its interior laws are not enough to make the future events happen and be predicted, it is under an exterior influence in making its future. Therefore, a chaotic system is somehow determined but somehow open to novelty, somehow ruled by interior laws and somehow affected by external factors. As a result, we face a considerable amount of uncertainty, openness, possibility, probability, and gap such that it can be called a subtle and supple situation (Polkinghorne 1996, 35). Another implication of what has been said above is the inseparability of the chaotic system from its environment. Although the systems of the world have a surprising power of self-organization, misunderstanding which would result and have resulted

in physicalism, their sensitivity, the impossibility of separating these systems from their environment, and their being affected by their environment make us think of them as not being pre-determined but as chaotic systems (Polkinghorne 2005, 35).

The Mechanism of Divine Action

If there was no divine action, the world would not be as it is now. In the first seconds of the beginning of the world, right after the big bang, it would be incredibly improbable for that chaotic system, that so-called cosmic soup, to go through an evolutionary process that resulted in its current situation without a kind of influence by a conscious exterior factor. Therefore, it completely makes sense to believe that God is the creator and preserver of the world, and by considering the world's continuity to be a chaotic system from that time until now, it also makes sense to see God as the supreme agent with special actions. Informational causality, as a complementary cause for energetic causality, is the very fashion of God's action in the world. With His act of pattern-forming, God establishes a somehow regular world on absolute chaos, though a little chaos remains. He does not determine the world, because the world is not determined at all; rather, He forms it with patterns. Polkinghorne, explicating the relation between chaos and order and acknowledging the metaphysical relation of binary poles, declares: "Chaos and order are complementary" (Polkinghorne 2006, 59; 1996, 23; see also Polkinghorne 2006, chaps. 3 and 5).

Hence, to formulate his understanding of divine action, he emphasizes that along with physical causes, which fulfill their causality in a bottom-up style, there are other causes at work, forming the patterns of the world's processes top-down in a dual-aspect

monistic way. In fact, there are two kinds of causality at work in the world: top-down and bottom-up—again in a complementarity relation (Polkinghorne 1996, 29-30). The former is what one can call divine activity in the world through pattern-forming the different possibilities, the so-called unknown attractor, totally and briefly named informational causality, though the latter is what has been referred to as physical laws, appropriately named here energetic causality.

Before finishing this part, it would be appropriate to mention one of the objections made by Arthur Peacocke. He believes that Polkinghorne's reference to chaotic systems' vulnerability to small disturbances makes God to be understood as actually manipulating micro-events within these initiating fluctuations in the natural world to produce the results He wills (Polkinghorne 1996, 39; Peacocke 1993, 154). Polkinghorne tries to avoid mere dependence on quantum mechanics and to say that divine action is not limited to under-atomic quantum events but includes all levels of the whole universe, though Peacocke attributes this false limitation to Polkinghorne not through his resort to quantum mechanics but through his interpretation of chaotic systems. This objection, however, is not left without a response. "This is a most unfortunate misunderstanding of my position" Polkinghorne answers (Polkinghorne 1996, 39). He explains that vulnerability to small disturbances is a sign of sensitivity to all circumstances, even to small ones, which consequently means its openness to novel and emergent changes that forces one to treat it holistically. It is difficult to find evidence for Peacocke's claim, and it seems Polkinghorne's apologia is acceptable.

So far, we have tried to present a brief account of Polkinghorne's formulation of divine action. In the following sections, some of the

most important presuppositions and implications of his view will be inspected.

Epistemological Presupposition: Epistemology Models Ontology

Polkinghorne's epistemological view is mostly science-based; he even sometimes calls it scientific realism (Polkinghorne 2011, 7). Basically, he thinks in a tradition in which epistemology is prior to ontology. Therefore, his epistemological standpoint determines his ontological view. It could be said that his standpoint in the epistemological realm is critical realism (see Polkinghorne 1996, 11-25).

By talking about critical realism, he mostly emphasizes the point that the uncertainty people face epistemologically, which is rooted in ontological indeterminacy, in fact shows that scientific understanding is not coherent with naïve realism: "The progress of science, with the changes of understanding that can result from this, make it clear that scientific achievement cannot be claimed to constitute the attainment of complete and absolute truth" (Polkinghorne 2011, 7). On the other hand, it is not acceptable to adhere to skepticism—namely, here, instrumentalism. He believes that the resistance of nature against our previous expectations represent how realistic are scientific engagements: "The recalcitrant way in which nature can resist our prior expectation is a powerful incentive to believing that in science we are actually exploring a world that stands over against us in its independent character" (Polkinghorne 2011, 6). His second step is based on the idea that epistemology models ontology, emphasizing that the uncertainties faced by humankind, are not merely a feature of our understanding, but also a feature of reality itself.

His intellectual steps can be explained as follows: (1) Naïve realism, idealism, and skepticism are not defensible; our understanding is neither correspondent, in all its levels and aspects, to an external in-itself reality nor is it just made-up and completely detached from any kind of reality (Polkinghorne 2011, 2-11). (2) Everything known as perception and understanding is somehow based on a kind of reality and somehow is based on an act of our understanding. In other words, to understand something, there are two parties at work, inseparable and interconnected factually but recognizable and distinguishable conceptually: the independent reality and the human role in the act of understanding. Consequently, some of the world's behaviors are predictable to us and some are not. (3) The third step is the derivation of the unpredictability and uncertainty. He, like all other physicists who have approved the Copenhagen's interpretation of uncertainty (Polkinghorne 2011, 37-38), unpredictability, and statistic feature of physics derive their ontological view from their epistemology. Moreover, one could not possibly find this feature of our perception only in physics but also in other sciences like biology, geology, and geography. Therefore, Copenhagen's interpretation of quantum uncertainty is not only limited to physics but also extended to other sciences (Polkinghorne 2011, 20) and then to the world as a whole, which is notably an extension from epistemology to ontology. Hence, the world he has epistemologically encountered is one with which his epistemological standpoint is coherent; it is a binary world, somehow regulated and determined and somehow open and uncertain.

Is His Formulation of Divine Action a Mere Iteration of the God of Deism?

In general, it must be said that due to refusing to see the world as deterministic and mechanical (Polkinghorne 2005, 36), deistic

conception of God might not be an implication of his formulation. A presupposition of the mechanical view is reductionism in all levels and aspects, which Polkinghorne explicitly rejects. In fact, he must be considered an emergentist. The implications of physical reductionism are believing in a closed world and a deistic God, which are inconsonant with scientific findings and the God of Scripture.

Considering this, it could be recognized why Polkinghorne starts his major works with an emphasis on metaphysics (Polkinghorne 2009, 97). Metaphysics, he thinks, is speaking of the world as a whole in the most complete possible way. Existence, in his thought, is not merely material but undoubtedly something more, possibly deeper and more transcendent. Metaphysics is the bridge between epistemology and ontology, exactly one which Immanuel Kant demolished and which has been neglected for centuries. For Polkinghorne, rejecting metaphysics ruins all his efforts, and thus metaphysics is the most strategic base in his thought.

Physicalism, which is a science-based metaphysics, is strongly rooted in humankind's recognition of the self-organization power of the super-complicated physical systems of the world. Physicalists believe that this power makes the presentation of a self-sufficient account of humankind and the world based on a mere physical science, without any need to resort to transcendent origins and ends, undoubtedly possible. The crucial point here is that Polkinghorne declares that this is an absolute metaphysics, exactly like other ones, so we ought to treat it like the other ones. As it has been said, the development of this metaphysics is due to the development of scientific accounts of the world. The problems of science, he believes, strongly challenge this viewpoint. He assumes, surprisingly, that some

contemporary scientific problems arose from the distance that has appeared between science and the overall view provided by metaphysic. The absence of an explicit relationship between different branches of science and even between scientific inter-disciplinary subjects utterly demonstrates this weakness of physicalism.

The problem of physical reductionists is that they have a problematic move in their argument, a move which is logically invalid. They claim, as an instance, that when a soccer player kicks the ball and this strike gives a specific amount of energy to the ball, then the only possible description of the reason of the movement of the ball is the energy which the soccer player's foot has transferred to the ball. In another example, if having a feeling is simultaneous with a chemical change in the brain, then the only possible reason for having this feeling is the chemical changes of the brain. But why do we think that if two material changes are simultaneous, there must be only one reason for that change and that reason must be a material one? This is exactly where that false move takes place. The material reason cannot be neglected, but why should we limit ourselves only to that material reason if we are not able to see other reasons with our material eyes? And why should we limit ourselves only to one reason and not more? So the move from that premise to the conclusion was not a logically valid one. The proposition "material effects are the only real effects" has much more to say than the proposition "there are some material effects"; therefore, the later cannot logically be concluded from the former; in other words, the relationship between the premises and the conclusion is not logically valid.

Moreover, what Polkinghorne stresses mostly is that the most central claim of physicalism is itself a non-physical one; rather, it is absolutely metaphysical and not established through experimental,

scientific methods. One can be neither reductionist nor physicalist to escape from metaphysics, and Polkinghorne, by rejecting both, tries to make more room for divine action and presents his account of his religious belief about it.

To sum up, if we say that the one and only system that organizes the world is energetic causality, and all causes and effects are solely physical, then we are trapped in reductionism. Now, if one wants to be a theist, the most coherent concept of God with that physical background is the god of deism, who simply created the world but is no more active in it. Considering Polkinghorne's points, none of these are acceptable, neither the factors affecting the events of the world are reducible to physical causes, nor the God of Scripture is the same as the god of deism.

Is His Formulation of Divine Action a Pointless Retelling of the Causal System Which Rules the World?

The answer is no. Considering the conceptual distinction between the bottom-up and top-down and between energetic and informational causality systems (Polkinghorne 2000, 123-24), and the major role of the concept of complementarity in describing the relation between these two systems, there would be no room for a positive answer to that question. Generally speaking, neither top-down and bottom-up causality nor energetic and informational causality are in a vertical relation; rather, Polkinghorne thinks in a complementary and transverse way, more or less like the mutual particle/wave behavior of light as described in contemporary physic (Polkinghorne 2005, 32; 2006, 84) without any reduplication. This is because there is basically no room for that; in his formulation, neither informational causality nor energetic causality can be considered as only the cause of an

event; the cause is textile, consisting of two conceptually distinguishable but really interconnected fibers.

The crucial point in his formulation is that the metaphysical situations of informational/energetic causality and top-down/bottom-up causality are exactly the same, and there is no ontological priority between them. Therefore, these pairs are essentially different from primary/secondary and factual/occasional causes, mainly because both his conceptual pairs are simultaneously understood and coherent with his ontologically monistic vision (Polkinghorne 2000, 95-99). This vision is derived from his epistemological view of the well-balanced roles of observation and intellectual activity in the formation of the two sides of the pairs, which means the causal impact of the higher levels of the world on the lower levels and vice versa and both energetic and informational causes are all equally the results of our observation and intellectual activity. They are not like conceptual pairs, such as primary and secondary causes, one of which is apparent and the other is hidden, one is tangible and open to experiment and the other is merely intellectual and open to the mind and its analytic faculty. Polkinghorne's conceptual pairs are neither vertical nor reducible to each other, exactly the same way the mutual particle/wave behavior and the principle of complementarity is described in physics. Therefore, it is not right, on the one hand, as in the case of mysticism or materialism, to consider one as the pure truth and the other as delusion, and, on the other hand, to resort to any kind of dualism that keeps each in an absolutely different way from the other.

Does This Interpretation of Divine Activity Mean Divine Intervention?

God's intervention means acting occasionally and provisionally in the world in which the only organizer and ruler is natural law. The

implication of admitting God's action in such a world is nothing but believing in God's intervention and activity against natural laws. Since the relationship between God and the world is mutual and one party is the world, a different interpretation of the world leads to a different interpretation of that mutual relationship. Therefore, we should look at Polkinghorne's picture of the world more carefully.

The world, as Polkinghorne sees it, is totally different from the Newtonian determined world; it contains some chaos but is not absolutely chaotic—otherwise, nothing would be understandable, even the concept of chaos itself. Therefore, the world in Polkinghorne's view is a combination of chaos and order. Order in the world is the symbol of God's trustworthiness and reliability, and chaos is the representation of God's free will (Polkinghorne 2005, 10-13). If one insists on one more than the other or ignores one of them completely, if, for instance, one claims that the world is so much law-bound that the Creator Himself is subject to His own created laws, then the only way for God to have an active role in the world is to intervene, which means acting against his own created laws. Ignoring the available incoherence in this account of God and also ignoring the crucial question why God sets rules in a way that if He Himself wants to do something, the only way for Him is to intervene and break the rules result in an obvious incoherence between this image of God and the God who has revealed Himself in the scriptures.

Therefore, the relation between God and the world is dependent on the definition of God and the world. If the world is ruled by some eternal rigid laws of nature, the only way to have some free actions in the world, whether by the Creator or by humankind, is to break the laws, exactly the picture one could draw of God's activity. In such a

world, God, at best, is merely a law, a physical, natural, philosophical, or logical law, such as the law of gravity or non-contradiction, without having any special role in the occurrence of such events as the ones attributed to Him in Scripture. On the opposite side, if one is able to depict the world in an undetermined and uncertain way, what happens in it, whether by a human or divine agent, would not be an intervention or interruption, for its future is not determined in its past but is open to novel changes that have not been pre-determined, even though some general patterns of the processes of the world may have limited its future possibilities and created a well-balanced situation between chaos and order. It ought to be said that if there were no patterns at all, there would be no conceivable concepts of anything, even of freedom itself. Therefore, it could be concluded that the world pictured by Polkinghorne is somehow a free and undetermined world, and the God he believes in is exactly the God of Scripture and Abrahamic religions. He is exactly on the opposite side of the intervention theory of God's action in the world. God's action, Polkinghorne thinks, does not imply any kind of intervention, but rather the openness of the world creates room for certain free actions.

Is His Formulation an Iteration of the Very Mistake of Natural Theology?

One point Polkinghorne insists on loudly is the distinction between possible concepts of divine nature. Speaking of God, he rejects the scientific, philosophical, and deistic concepts of God, and holds on to the God of Abraham, Isaac, Jacob, Moses and Christ (Polkinghorne 2005, 3), who has introduced Himself in Scripture as absolutely active in the evolution of history. Then, the question here is whether this concept is valid in the age of science. To answer, he sets two steps: first, one ought to show that this account of God's activity is not incompatible with scientific findings; the second step is to discuss

whether divine activity and scientific findings have any correlativity and interconnection, whether one helps the other in understanding the reality or they are absolutely different or even contradictory. He explains the problems of a scientific god as shown in natural theology and also the challenges posed by science against theology to warn about the dangers of approaching science and religion. According to Polkinghorne, the god of natural theology, left lonely by Himself, cannot lead to the God of Scriptures. So, the main question is whether one could reconcile these two concepts of God or not.

Sometimes, it is thought that the God of Abrahamic religions is like a dictator who does everything He wants at each moment without setting any law in advance. On the other hand, the god of natural theology is thought to be so organized that he cannot escape from his own created laws and is bound by his own rules. Each of these two descriptions over-emphasize one of God's attributes: the former is an over-emphasis on God's freedom and absolute will and the latter on God's reliability and trustworthiness. What science and Scripture show us of the nature of divine action is a combination of both God being somehow free and somehow reliable and organized, God's immanence and transcendence. The world, on the other hand, possesses some amount of freedom and openness to its future that enables free agents, whether human or divine, to act freely and some amount of organization and order that enables science to find out the patterns that partly rule it. According to what science has shown us of the nature of the world,¹ it is not absolutely organized and ordered, and by getting help from religion in understanding the reality, the

1. In Polkinghorne's epistemological view, our scientific picture of the world is not complete and certain but reliable.

theology of nature appears. Therefore, the picture of reality based on the theology of nature does not contradict scientific insights or Scripture.

The most crucial point of Polkinghorne's interpretation of divine action and what must be considered his novel contribution is the concept of God's active information, without which his view is nothing more than a rewording of the doctrine of divine action in natural theology. Therefore, it would be necessary to show that it is more than a mere iteration of natural theology, but it is also important to note that his novel idea is not left without criticism. We have mentioned one by Arthur Peacocke, and we will mention two more objections below.

The first criticism by Terry J. Wright is an attempt to show that "informational causality is no more than an interpretation of primary causality for a scientific age" (Watts and Knight 2012, 34). As it has been claimed that informational causality describes the world in a way that primary causality is unable to do, his aim is to show the resemblance between the idea of primary causality in natural theology and Polkinghorne's description of pure active information. It might be argued that just as primary causality does not determine what divine action and nature's action are, the concept of informational causality, according to which everything is constrained by divine informational action, does not determine what nature's action and divine action are. Polkinghorne, answering implicitly, refers to Genesis 1:24-5 to argue that divine action may still be discerned, although not demonstrated or proved, through faith. Another possible apologia is that divine action is aimed at chaotic systems, but because Polkinghorne believes that the whole universe is a chaotic system, this answer is not enough either. Finally, it seems that there is no difference between primary

causality and informational causality here. According to both, regulations are signs of God's truthfulness, though they do not limit divine action and He can have novel actions. Based on primary causality, not only secondary causality depends on primary causality but also God can act in the physical world without utilizing secondary causes; and in informational causality, God's free will and not being limited are emphasized. However, it seems that the world as described by natural theology is so determined that there is no room for novelty in it and the only way of God's interaction with it is to intervene, which is against God's wisdom as it means that He has created the world in such an orderly manner that the only possible way He can act in it is to interrupt His created order. Therefore, divine action is more consonant with informational causality than with primary causality.

Also, it might be objected that informational causality also involves determinism, because as Polkinghorne describes it, this type of causality constrains world processes but does not determine them; it only gives the world the most general patterns and leaves enough room for different choices not from infinite possibilities but from a limited number of them. Another objection is that although informational causality fills the gap of causal joint, which primary causality lacks, there might be still a gap between God and informational causality, but this can be answered considering that informational causality is divine action not the object of God's action. At the end, Polkinghorne thinks that distinguishing between God's special action, which is the concern of informational causality, God's action of preserving the world and God's radically novel actions, i.e., miracles, will answer all the above questions, explaining that a chaotic system requires the causal joint to constrain its possible future situations, which is God's pure active information. According to

Polkinghorne, “The enterprise was able to show that one could take what physics really implies with all due seriousness, without being driven to deny the reality of human or providential agency” (Watts and Knight 2012, 273).

There is a criticism proposed by Sebastian Matescu aimed at showing that informational causality is a concept that is not able to achieve its initial goal and so it is not enough for explaining divine action. Quantum potential, a physical description of particle trajectories by D. Bohm, is a kind of force that defines a non-classical “implicit order” and connection between quantum entities (Mateiescu 2014). Instead of mechanical influence, it imparts information that determines particle trajectories, and Polkinghorne takes insight from it for explaining his idea of informational causality. On the other hand, it can be concluded from Polkinghorne’s interpretation that information is the initial ontological category of the whole world. What is needed for a coherent description of the divine action of the God of Scripture is to give singularity and distinctiveness to His actions. Putting these presuppositions together will result in a dilemma. On the one hand, the concept of information in Bohm’s description of quantum potential is obsolete, and replaced by the quantum potential’s reduction to the distribution of probability of energy states of quantum particles, based on which informational causality could be done with traditional energetic tools (Mateiescu 2014, 26), and thus there would be no difference between divine action and natural actions. On the other hand, if we understand information as the initial ontological category of the world, again it might be objected that there is no difference between God’s action and natural processes. When matter and energy both are information, all natural processes take place through informational changes, and so does divine action. Thus, the idea of informational causality does not achieve what it seeks, that is,

allocation of distinctiveness to divine action. The possible apologia to this dilemma is that Polkinghorne does not treat quantum potential as an absolutely true explanation but as a possible explanation. In other words, he uses it for clarifying his idea of information, not for answering conclusively the question of what the very nature of information is. It could also be said that there is not enough evidence for the claim that Polkinghorne sees information as the very ontological nature of the world. Energetic causality, which science is at work to understand, is not a mental fiction but something that ontologically interlocks with informational causality, and which, if not mixed with physical processes, is the same as divine action and not the nature of the universe. So, although this dilemma clears some aspects of Polkinghorne's description, it does not refute it as an indefensible interpretation.

One final problem is what Polkinghorne himself mentions as the complexity of the notion of information (Polkinghorne 1996, 36; 2005, 32, 48). If his interpretation of divine action is based on the concept of information and this concept is not clear enough to grasp, then his interpretation is not really acceptable. The ambiguity of the concept of information is true and Polkinghorne acknowledges it, but the point here is that every pioneer concept in the history of thought has been in the same situation. It needs a lot of discussion and clarification to become suitable for explaining divine action. What makes it valuable is its potential for accepting novel theological and scientific meanings. Despite these objections and whether his responses are convincing or not, Polkinghorne's contribution seems immensely insightful and enlightening for the interaction between science and religion.

Conclusion

To understand the relation between God and the world, one has to first clarify one's idea of the two parties of this relation and then explain its nature. The God Polkinghorne has in mind is the God of Abrahamic religions, the God of Abraham, Isaac, Jacob, the One who saves the believers and punishes the infidels, the One who permits both believers and infidels to utilize natural laws for their purposes, though He has some miracles, which all in all can be called God's special actions. The world, based on what can be understood from quantum physics, the chaos theory, the evolutionary vision of history, and the relativity theory is not determined as pictured by Newtonian physics. Both organization/order and freedom/openness are the results of divine action: the former is the representation of God's immanence and the latter is indicative of God's free will and transcendence. The cooperation between science and religion presents a picture of the reality, called the theology of nature, in which the same natural laws are effective, human and divine agents are free, the future of the world is open, and God is free to fulfill His will. God is somehow directing the evolution of history by an act of pattern-forming in the world's processes. God does not determine anything but forms the most general patterns and gives some freedom to His creatures to somehow make themselves as they want. If God decides to do something special in a special occasion, He could do that without intervening or breaking the rules through informational causality intertwined with energetic causality. In such a view of the world and God, novel answers can be given to some difficult problems in religion.

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