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DIVINE ACTION AND MODERN SCIENCE

Divine Action and Modern Science considers the relationship between the natural sciences and the concept of God acting in the world. Nicholas Saunders examines the Biblical motivations for asserting a continuing notion of divine action and identifies several different theological approaches to the problem. He considers their theoretical relationships with the laws of nature, indeterminism and probabilistic causation. His book then embarks on a radical critique of current attempts to reconcile special divine action with quantum theory, chaos theory and quantum chaos. As well as considering the implications of these problems for common interpretations of divine action, Saunders also surveys and codifies the many different theological, philosophical and scientific responses to divine action. The conclusion reached is that we are still far from a satisfactory account of how God might act in a manner that is consonant with modern science despite the copious recent scholarship in this area.

NICHOLAS SAUNDERS is Honorary Associate of the Ian Ramsey Centre at the University of Oxford. He has won several international prizes for his science and theology research, including the prestigious Biennial Prize of the European Society for the Study of Science and Theology, and a John Templeton Foundation Exemplary Published Papers Prize.

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To my wife and my mother, with all my love

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Preface

The Methods of Divine Wisdom are Infinite and Unsearchable, and we must not expect fully to comprehend all the Secrets and Mysteries of God's Government, but something we may know of this, enough to teach us to reverence God, and to trust in him, and to vindicate his Providence from the Cavils of Ignorance and Infidelity; which is as much as is useful for us to know.

(Sherlock 1694, 50–1)

There are of course limits to what we as human beings can say about God's activity in the world. The point was not lost on William Sherlock, a seventeenth-century Dean of St Paul's Cathedral in London, with his assertion that we could not hope to discern all of God's mysteries and secrets. We can never aspire to have a comprehensive understanding of the manner in which God acts in the world, but equally this should not push us to the opposite extreme of asserting that God's transcendent relationship with creation simply precludes any meaningful discussion of his action whatsoever. Theologians need to tread a careful middle way between claiming on the one hand that God is limited to those things human beings know and understand, and on the other that we have no relevant knowledge about divine action at all. This difficulty becomes particularly acute given the remarkable advances that the sciences have made in both explaining and predicting natural processes. Where Sherlock was concerned to vindicate divine providence from the 'Cavils of Ignorance and Infidelity', essentially to refine his understanding of God's action on the basis of what *he* knew about the nature of creation, many contemporary scientist-theologians have adopted a similar strategy with the aim of developing an understanding of divine action which is sensitive to modern scientific developments.

It must be made clear from the outset that the argument which follows rejects any rigid and immutable categorisation between those explanations offered by science and theology. It is, however, quite wrong to

assert naïvely that science and theology are methodologically identical or address identical levels of explanation and questions. There has been much recent debate on the nature of this relationship and I shall not attempt to deal with it in any detail here. On a very simplistic level a difference between the two disciplines arises because it is impossible to perform theological ‘experiments’ in anything like the manner of the natural sciences. The assertion runs deeper than this, however, because it also arises as a result of the vastly different evaluative processes used by theologians and scientists to decide what is a successful theory or doctrine. This fact is clear from even a cursory examination of the tests, checks and motivations under which a scientific theory is accepted by the scientific community at large and these are quite different from those that lead to theological doctrine becoming widely accepted. Nevertheless it remains the case that *both* theology and science make overlapping truth claims about the same reality, namely the nature of God’s creation, and thus it is critical that our theological doctrine, claims and understanding must be examined against the wider criteria of coherence with what we know from science, and similarly that what we know scientifically should be considered in the light of, and tested for coherence with, our current theological understanding. This latter assertion, namely that particular scientific theories may be critiqued, and possibly even rejected, on *theological grounds* may sound like undue theological optimism, however there are a number of occasions in the recent history of science when this may have been exactly what took place. One example was the widespread acceptance of big-bang cosmological models over the steady state model. Some scholars have suggested that the acceptance of the big-bang account was in no small part due to the fact that the idea of a big-bang genesis of the universe appeared on initial reflection to be so germane to the concept of a creator God bringing the universe into existence *ex nihilo*. Another interesting area in which theology may have something to teach science concerns the infamous measurement problem in quantum mechanics (see chapter 6 below). Given the various competing philosophical approaches to quantum measurement it may be that several of these are open to reconsideration, and even rejection, on the basis of their *theological* implications. I have argued in chapter 6 that this is possible given detailed considerations of the theological implications of the so-called ‘many worlds’ approach.

Throughout the pages that follow the emphasis is nevertheless primarily on considering theological assertions in the light of coherence with our modern understanding of science. Given that many theologians have

grappled with the problem of God's action in the world with only scant regard for the often conflicting scientific understanding of nature there is a great deal of material to consider in this context. The task is an absolutely necessary one for two reasons. Firstly to ensure that contemporary understanding of God has relevance to modern thought, and our current scientific worldview, and is not thus relegated to an antiquarian curiosity. Doctrine can only effectively be used as apologetic when it addresses the needs, concerns and contemporary understanding of the community it is addressed to – something St Paul was acutely aware of when he wrote the various letters to Christian communities that form a central part of the New Testament. Secondly, and more importantly, theological doctrine must be evaluated against wider scientific considerations for the simple reason that we want to get our understanding of God and creation as correct and as true to reality as possible. Inherent in this latter claim is an assertion that both theology and science are realist theories – that is to say our theological and scientific claims are in at least a limited sense related to what is actually 'out there', what actually constitutes the ontology of the world. Relating a realist interpretation of theological doctrine and scientific knowledge is no easy task – not least because very few philosophers of science would accept that there is a one-to-one correspondence between what science tells us epistemologically and the ontology of the world. That is to say that few scientists are naïve realists.

Indeed the difficulty in striking the above balance between an understanding of divine action based on what we know as human beings and God's transcendent nature becomes all the more complex by virtue of the constantly changing nature of human understanding of both science and theology. Scientific theories in particular are generally accepted to be provisional in the sense that they form the best understanding at the present, but with the caveat that the theory in question may be modified or refined in the future. Given that correct theological understanding of God must both be enriched by and be compatible with the present state of our scientific knowledge, this has profound implications for contemporary theology. In general theologians must come to accept that their theological understanding of God's creation is informed by *current* scientific thinking and thus must similarly be essentially provisional in nature. This need not lead theology to a sense of despair, irrecoverable relativism, or a pseudo-post-modernist assertion that as theologians all aspects of the truth about God will always remain veiled from us. Although it is a major change for many theologians to accept that some

aspects of their understanding and theological doctrine are only provisional in the sense that they may later be replaced or modified, so long as the replacements and modifications that later take place get us closer to a true understanding of the ontology of God, then they are surely both necessary if theology is to remain a valuable intellectual discipline, and wholly justified.

The fact that our knowledge of science is often only provisional in this sense has the consequence that it must be inappropriate to conceive of an overarching theory of divine action which seeks to explain the interaction between God and science in all its details. To do so ignores the fact that scientific theories are disproved and refined, and also that theological doctrine and understanding similarly develops on its own account. Surely the best approach to the question of divine action given these difficulties is to consider our current hesitant *models* of God's action in all their details while simultaneously acknowledging the inherent limitations of our human perspective and the provisional nature of our models. Despite these huge limitations on the scope of our study of divine action there remains a great deal that science can contribute to theological understanding, and it would be quite wrong to argue that we are consequently forced into the despair of the claim that theology cannot as a consequence make realistic claims about the nature of God.

Before we begin to consider these issues in depth it is important to be absolutely explicit about the approach adopted in this book to relating these very different concepts. Methodological issues pervade any meaningful discussion on the interface between science and theology and this book is by no means immune from the need to adopt a coherent framework for addressing the interface. It should be noted, however, that this is *not* a book on the theoretical relationship between the two disciplines. In essence it is assumed that they are *theoretically* reconcilable, although this is crucially not to make the claim that they are both methodologically identical. This book adopts the presumption that God exists and is active in the natural world in a continuing and particular sense (i.e. that God performs special divine actions in creation). Consequently science and theology are not equal methodological partners in the dialogue which follows. The approach adopted is to identify a set of theological demands which a limited conception of divine action makes and this largely sets an agenda for evaluating the models discussed. It is only after having pushed the claim that God is active as far as possible in connection with the various scientific approaches considered that conclusions are reached about the cogency of the initial premise, namely whether it is actually

defensible to assert still that God is active in the world. One potential criticism of this approach is that it is to a certain extent dependent on an implicit doctrinal tradition which guides the claims made about God's action. However the approach adopted bypasses this difficulty by discussing the claim that God is active in its most basic form, namely an assertion that God by acting initiates novel causal interactions in nature. Where there are strong claims against a critical realist interpretation of science, such as those propounded in relation to chaos theory, this fact is noted in the text. Indeed it may be, as is argued in the last chapter, that the strong sense of divine action which forms our theological inheritance is simply untenable in the light of our modern understanding of the natural sciences.

At the very least it would seem that some modification of our 'traditional' understanding of divine action would appear inevitable. As such the approach adopted is that we use theological models in an analogous sense to scientific ones, although there are clearly limits to the analogy. What must be clear, however, is that our understanding of the reality of God must be open to change and modification in the light of other evaluative criteria such as the natural sciences. Theologians are generally very scared about getting their theology 'wrong' and consequently endeavour to construct far wider grand syntheses than would ever be attempted scientifically. However, one of the principal implications of our relatively recent deepening understanding of the nature and structure of God's creation is that those theological models we inherit *must* undergo some kind of revision or evaluation process if we are to get closer to understanding the nature of God. While these evaluation criteria are much wider and more complex than analogous scientific ones, they are, I believe, none the less real or forceful because of this. It remains clear that the *ultimate* nature of God's action in the natural world will remain a mystery to human beings, but it must not be forgotten that the natural sciences and theology are both making claims about the ontology of the same creation and as such we cannot simply adopt a 'head in the sand' approach to these issues if belief in God is to have any intellectual coherence in this modern age.

The problem of how God acts in the world can appear truly intractable and there are a huge number of theological, philosophical and scientific factors that may be relevant. In an attempt to remain focussed on the relationship between science and theology readers will find little discussion in the following pages of the problem of evil, detailed examinations of the Biblical and other motivations for asserting God's actions, or a

comprehensive methodology of the relationship between science and theology.

In chapter 1 we examine the stimuli for asserting that God acts in the natural world. In particular the often cited ‘Biblical’ account of divine action is placed into the context of the Near Eastern approach to natural phenomena. We examine the Biblical theology movement and identify some of the implicit *scientific* assumptions that are made in this discussion. The conclusion reached is that a direct appropriation of Biblical accounts of divine action into a contemporary dialogue with science is very problematic and that consequently it is necessary to rely on other stimuli such as notions of doctrinal coherence.

Chapter 2 critiques some of the most common theological approaches to divine action. The discussion begins with an attempt to delineate special and general divine actions on the basis of the scientific particularity of God’s action. It is emphasised throughout that an account of special divine action (SDA) must include statements about the causal operation of that action, even if these are very difficult to particularise. Attempts to claim parity between the world and God’s body for the purposes of action are rejected on the basis of a detailed analysis of the concept of intentional action and the assumptions inherent in the world as God’s body position. Similarly a notion of God’s action in the human mind as distinct from that ‘in nature’ is rejected although it is acknowledged that the mode of operation of SDA in the mind may be fundamentally different. Finally a distinction is drawn between compatibilist and incompatibilist notions of SDA by analogy with the human free action debate on the basis of the initiation of causal sequences in nature by God.

We then turn to examine the relationship between incompatibilist SDA and the concept of laws of nature in chapter 3. After noting the reluctance of many modern scientist-theologians to appropriate the traditional understanding of miracle as a law-violation in discussions of SDA we consider some of the philosophical conceptions of laws of nature in detail. It becomes clear that there is considerably more consonance between the laws of nature and incompatibilist SDA than has been widely acknowledged, and that not only is the concept of miracle as a violation of the laws of nature theologically undesirable, but it is actually extremely difficult to support from the perspective of philosophy of science. Indeed it becomes clear that only on a naïve necessitarian interpretation of the laws of nature could SDA ever constitute a law-violation. On the other hand there is no equivalent of law violation in connection with

a regularist interpretation of laws of nature because of the primacy of individual events in this explanatory scheme. Accordingly the laws that the regularist asserts are formed around whatever events actually take place in the world be they ‘naturally’ or ‘divinely’ caused, and thus SDA becomes subsumed under law-like statements. The implications for combining this approach with a theistic assertion that God is regularly active in the world are considered in detail. The approach adopted throughout this chapter is to make the assertion that incompatibilist SDA is an objective feature of the world and then consider when on each of these interpretations of the laws of nature it becomes interventionist as opposed to non-interventionist. The conclusion reached is that for SDA to be asserted in a non-interventionist sense, given an essentially necessitarian reading of natural laws, we are forced into a detailed examination of what constitutes the scope of applicability of these laws and the possibility of probabilistic and indeterministic laws of nature. With regard to these latter approaches Karl Hempel’s notion of epistemic ambiguity is discussed and the conclusion reached that a detailed understanding of claims for determinism in physical laws is a necessary part of an assertion of incompatibilist SDA.

Chapter 4 then considers the notion of indeterminism and its relationship to SDA in more detail. William James’ ontological approach to determinism is adopted as the most theologically consonant and is discussed in relation to prediction by a detailed discussion of Karl Popper’s use of the term ‘determinism’. The relationship of a creator God to genuine indeterminism is discussed and the conclusion reached that if indeterminism exists then an implied divine kenosis may be required because of the dependence of indeterminism on God’s sustenance. This has important implications for the assertion that God is active through indeterministic processes because it raises questions about the consistency and rationality of the assertion that God simultaneously sustains the world and indeterministic processes in being, while choosing to override the indeterminism on certain occasions to achieve particular actions.

In chapter 5 we consider some of the claims made by theologians who seek to relate SDA and quantum mechanics (which is generally interpreted as a paradigm indeterministic theory). It is shown how William Pollard, who is commonly cited as the precursor of this position, is actually one of a long line of physicists to make SDA claims in connection with quantum physics. Moreover a detailed reading of Pollard’s work shows that it is quite wrong to assert that he envisaged God as active *solely* at a quantum scale. The similarities between his position and those of

Karl Heim, J. J. Thompson and Arthur Compton and others are discussed in detail as are later authors who have developed similar positions such as Thomas Tracy, Nancey Murphy and Bob Russell. Their positions are shown to be broadly similar save that they differ as to whether God is active in every or only some quantum ‘events’.

Chapter 6 considers quantum theory in detail and questions whether it can really instantiate the notions of SDA that those theologians discussed in chapter 5 have asserted. It is shown how incompatibilist SDA cannot be related to the Heisenberg Uncertainty Principle, and it is argued that if God is active through quantum theory then this must take the form of a measurement interaction. The potential for asserting SDA in each of the most common interpretations of the measurement problem is discussed in detail and the conclusion reached that on our current understanding of the theory SDA is not supported by quantum mechanics in any of its forms.

Chapter 7 then considers the relationship between SDA and chaos theory. John Polkinghorne’s arguments that God acts through chaotic phenomena are examined in some detail. It is shown how Polkinghorne’s proposal is fundamentally a metaphysical *postulate* about a pervasive indeterminism operating in the real world which is only mathematically modelled by the deterministic equations of chaos theory. Furthermore Polkinghorne’s argument is shown to be based on certain features of deterministic mathematical systems which are then taken to be indicative of this postulated ontological indeterminacy and the logical basis for this argument is critiqued. It is for these reasons that almost all of the common so-called ‘critiques’ of Polkinghorne’s position on the basis that chaos theory is fundamentally deterministic simply miss the essential basis of his argument and do not address what is essentially a *postulate* about the nature of physical reality. An alternative critique is offered on the above basis and that of a detailed consideration of ‘active information’ input into chaos theory. It is shown that the implication of this latter claim for SDA without any energetic input into the system in question is that this can only take place at the point where chaotic trajectories converge at the infinite limit of a chaotic attractor. It is argued that the real world cannot instantiate the infinite fractal intricacy which forms an inherent part of chaotic modelling, and accordingly that SDA by the input of active information in chaos theory cannot be a correct approach to God’s action in the real world.

Chapter 8 then considers Arthur Peacocke’s notion of whole/part SDA and reaches some general conclusions about the types of physical

systems that might be suitable candidates for Peacocke's methodology. We then return to reconsider the relationship between laws of nature and SDA and whether an approach to SDA which is reliant on Nancy Cartwright's assertion that the laws of nature only form an explanatory 'patchwork' may be a fruitful direction for future research.

Chapter 9 draws the conclusions from the preceding chapters together and argues that the current state of coherent attempts to relate divine action and modern science is far less developed than is widely realised. The conclusion is reached that neither of the two major approaches to the issue in contemporary theology and science, namely the quantum- and chaos-based approaches, survives detailed scientific and theological scrutiny. In this light the conclusion reached is that the 'current state of the art' in this field constitutes little more than a number of bold metaphysical assertions such as that of whole/part causation and accordingly there is very little detailed contemporary support for SDA.

I am often aware that it is much easier to critique what others have written than it is to develop a novel approach of one's own and thus owe a great debt to the many scientists and theologians who have debated these matters in depth over the past forty years. I owe thanks to David Hoyle for getting me interested in theology in the first place and fostering such a conducive atmosphere to studying it as an undergraduate. I owe a particular debt to my academic supervisor, Fraser Watts, who did much to develop my understanding of the interface between science and theology and I am also grateful to the members of the Theory of Condensed Matter Group of the Cavendish Laboratory at Cambridge who so kindly took me into their midst – it was a wonderful experience being a scientist-theologian in the Cavendish Laboratory! I would like to thank my former colleagues at the European Laboratory for Particle Physics (CERN) in Geneva who constructively challenged much of my thinking. I have had stimulating conversations with John Polkinghorne, Arthur Peacocke, and Philip Clayton in particular, as well as Nancey Murphy, Tom Tracy, Richard Southern, Iain MacKenzie, Brian Josephson, Michael Redhead, Peter Smith, Keith Ward and several anonymous referees from Zygon and Cambridge University Press. I would also like to express gratitude to the staff of the Humanities 2 Reading Room of the British Library in London who have helped me to track down several more obscure publications. I owe thanks to the Humanities Research Board of the British Academy and the Epiphany Philosophers' Trust who provided financial support for my research. I was also grateful to receive the 1998 Research Prize from ESSSAT, the

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European Society for the Study of Science and Theology, and an ‘Exemplary Papers in Humility Theology’ award from the John Templeton Foundation in 1999. I have presented the argument behind chapters 6 and 7 of this book in various forms at the ESSSAT conferences, undergraduate lectures and seminars at Cambridge University, and at the Ian Ramsey Centre at Oxford University, and I am indebted for the helpful feedback I received at those meetings.

I am particularly grateful to my mother for always supporting me in making the change from physics to theology and for her continuing support even when it was diagnosed that she had what unfortunately turned out to be terminal cancer. May she rest in peace. Finally my love and thanks go to Nicola my wife who has put up with the financial and emotional demands of me studying to qualify as a barrister while still working part-time as a theologian.