The Science and Religion Debate - an Introduction

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Summary

Science and theology have things to say to each other since both are concerned with the search for truth attained through motivated belief. Important topics for the conversation include natural theology, creation, divine providence and miracle. This paper provides a brief overview of the current status of the conversation.

Participants in the debate between science and religion employ a number of different strategies, depending upon whether they are seeking confrontation or harmony, but for an initial introduction the first task is to survey the actual issues that comprise the agenda for discussion.

The natural debating partner for science is theology, the intellectual discipline that reflects upon religious experience, just as science reflects on human investigation of the physical universe. Both science and theology claim that they are exploring the nature of reality, but they clearly do so at different levels. The object of study for the natural sciences is the physical world and the living beings that inhabit it. The sciences treat their subject matter objectively, in an impersonal mode of encounter that employs the investigative tool of experimental interrogation. Nature is subjected to testing, based on experiences that are, in principle, repeatable as often as experimentalists may require. Even historical sciences, such as physical cosmology or evolutionary biology, rely for much of their explanatory power on the insights of the directly experimental sciences, such as physics and genetics. The aim of science is an accurate understanding of how things happen. Its concern is with the process of the world.

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Theology's concern is with the quest for truth about the nature of God, the One who is properly to be met with in awe and obedience and who is not available to be put to the experimental test. As with all the forms of personal engagement, encounter with the transpersonal reality of the divine has to be based on trusting and its character is intrinsically individual and unique. Religious experiences cannot simply be brought about by human manipulation. Instead theology relies on revelatory acts of divine self-disclosure. In particular, all religious traditions look back to foundational events from which the tradition takes its origin and which play a unique role in shaping its understanding of the nature of deity. In relation to cosmic history, theology's central aim is to address the question of *why* events have happened. Its concern is with issues of meaning and purpose. Belief in God the Creator carries the implication of a divine mind and will lying behind what has been going on in the universe.

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These differences in the characteristics of science and theology have led some to suppose that they are completely detached from each other, concerned with separate, and indeed incommensurate, forms of discourse. If that were so, there could be no real science and religion debate. This picture of two disjoint languages has been popular with those scientists who do not want to be disrespectful to religion, understood as a human cultural activity, but who do not want to take seriously its cognitive claims to knowledge of God. If this stance is adopted, a comparison between science and theology is then frequently made in terms that are, in fact, unfavourable to religion. Often, science is held to deal with facts, while religion is supposed to be based solely on opinion. This is a double mistake.

Twentieth century analyses of the philosophy of science have made it clear that the scientific search for understanding is based on something much more subtle than the unproblematic confrontation of indubitable experimental facts with inescapable theoretical predictions. Theory and experiment intertwine in intricate ways and there are no interesting scientific facts that are not already interpreted facts. Appeal to theory is necessary in order to explain what is actually being measured by sophisticated apparatus. For its part, theology is not based on the mere assertion of unquestionable truths derived from the utterances of an unquestionable authority. Religious belief has its own proper motivations and its appeal to revelation is concerned with the interpretation of uniquely significant occasions of divine disclosure, rather than to propositional truths mysteriously conveyed.

A number of considerations show that a thesis of the mutual independence of science and theology is too crude a picture to be

persuasive. How? and Why? are questions that may be asked simultaneously of what is happening and often both must be addressed if an adequate understanding is to be attained. The kettle is boiling both because burning gas heats the water and because someone wants to make a pot of tea. The two questions are certainly logically distinct, and there is no inevitable entailment linking their answers, but nevertheless there must be a degree of consonance between the forms that these answers take. Putting the kettle in the refrigerator with the intention of making tea does not make much sense.

Theology has to listen to science's account of the history of the universe and determine how it relates to the religious belief that the world is God's creation. If there were seen to be a total misfit, some form of revision would be called for. Religious fundamentalists believe that this would always have to be on the side of science, while scientistic fundamentalists believe that religion is simply irrelevant to a full understanding of the cosmos. These extreme positions correspond to a conflict picture of the relation between science and religion. One side or the other must achieve total victory in the debate, a seriously distorted aim that fails to recognise the complementary relationship between these two forms of the search for truth. A better-balanced view is that both accounts deserve to be scrupulously assessed in their relationship to each other, an activity that furnishes a creative agenda for the debate between science and religion.

Both science and theology have been subjected to postmodernist assertions that their meta-narratives are simply made-up tales, communally endorsed. Both respond by appeals to the experiential motivations for their beliefs and both claim that what is called critical realism best describes their achievements. This means that neither attains exhaustive knowledge – for the exploration of nature continually reveals new and unexpected insights, and the infinite reality of God will always exceed the grasp of finite human beings – but both believe that they achieve verisimilitude, the making of maps of aspects of reality that are adequate for some, but not every, purpose. In making these critical realist claims, science and theology exhibit a degree of cousinly relationship, and that in itself is sufficient to encourage dialogue between them.

Science has purchased its great success by the modesty of its ambition, restricting itself to impersonal encounter and seeking to answer only limited questions concerning process. The fact is, science trawls experience with a coarse-grained net. Its account of music is framed in terms of neural response to the impact of airwaves on the eardrum. The deep mystery of music – how a temporal sequence of sounds can speak of an eternal realm of beauty – totally eludes its grasp. An important element in the contemporary debate between science and religion is the recognition of the importance of 'limit questions', which refer to issues that arise from doing science but which go beyond science's self-limited power to answer. These limit questions have been the basis of a new kind of natural theology, largely developed by scientists themselves, including some who are not adherents of any faith tradition.

Natural Theology

Natural theology is the attempt to learn something of God from general considerations, such as the exercise of reason and the inspection of the world. Its classic form was associated with thinkers such as Aquinas (thirteenth century) and William Paley (1743-1805). They spoke in terms of 'proofs' of God's existence and often sought theological explanations of the functional aptness of living beings, understood as having been designed by the divine Artificer. Contemporary natural theology is more modest in its character. Its aim is not logical coerciveness but insightful understanding, and the claim being made is that theism explains more than atheism can. Natural theology's relationship to science is one of complementarity rather than rivalry. It acknowledges that scientific questions may be expected to receive scientific answers and so the new natural theology focuses on addressing those limit questions that arise from science but go beyond its explanatory scope. Two of these metaquestions have been particularly important.

'A religious understanding renders the intelligibility of the universe itself intelligible'

The first concerns the reason why science is possible at all, in the deep and extensive way that it is. Of course the evolutionary necessity for survival can explain why humans are able to make rough and ready sense of everyday phenomena. Yet it is difficult to believe that our ability to understand the subatomic world of quantum physics and the cosmic realm of curved space-time – both regimes remote from direct impact on everyday events and both requiring for their understanding highly counter-intuitive modes of thought – is simply a happy spin-off from survival necessity. And not only is the world deeply rationally transparent to scientific enquiry, but it is also deeply rationally beautiful, time and again affording scientists the reward of wonder as a recompense for the labour of research. In fundamental physics it is a proven technique of discovery to seek theories whose expression is in terms of equations possessing the unmistakable character of mathematical beauty, since it has been found that only such theories turn out to have the long-term fruitfulness that persuades us of their verisimilitude. Why deep science is possible, and why its success intimately involves the apparently abstract discipline of mathematics, are surely significant questions about the nature of the world in which we live. Science itself is unable to offer an explanation of this profound character of the laws of nature, for it has to treat them simply as the unexplained basis assumed for its explanation of the details of process. Yet it seems intellectually very unsatisfactory to leave the matter there, as if science were simply a happy accident. A religious understanding renders the intelligibility of the universe itself intelligible, for it says that the world is shot through with signs of mind precisely because the Mind of its Creator lies behind its wonderful order.

That order is not only beautiful, it is also profoundly fruitful. The universe as we know it started 13.7 billion years ago, essentially as an expanding, almost uniform, ball of energy. Today the universe is rich and complex, with saints and scientists among its inhabitants. Not only might this fact in itself suggest that something has been going on in cosmic history beyond what science can tell, but also science's understanding of the evolutionary processes of that history has shown that, in a real sense, the cosmos was pregnant with the potentiality for carbon-based life from the beginning. The given character of the basic laws of nature had to take a quantitatively specific form for life to be possible anywhere within the universe. This 'fine-tuning' of fundamental parameters is usually called the Anthropic Principle[1]. A world capable of producing self-conscious beings is a very particular universe indeed. This cosmic specificity raises the second metaquestion of why this should be so.

1 For more on the Anthropic Principle see Faraday Paper No 3: J.C. Polkinghorne, 'The Anthropic Principle and the Science and Religion Debate'.

Anthropic fine-tuning came as a shock to many scientists. They tend to prefer the general to the particular and so they were inclined to suppose that there was nothing very special about our world. Natural theology understands anthropic potentiality to be the gift of the Creator to creation. Those who refuse this insight are either driven to regard fine-tuning as another incredibly happy accident, or to embrace the extraordinary supposition that there is, in fact, a vast multiverse composed of very many very different universes, all but one unobservable by us, with our world just by chance the one in which circumstances permit the development of carbon-based life.

Creation

The doctrine of creation is not primarily concerned with how things began, but why they exist. God is seen to be the ordainer and sustainer of the cosmos, as much its Creator today as at the epoch of the big bang. The latter event is interesting scientifically, but not really critical theologically. This understanding leads to the picture of creation as a continuously unfolding process in which God acts as much through the results of natural process as in any other way. A fruitful dialogue between science and religion has to be based on this understanding of creation.

'The gift of love must always be some due form of independence granted to the object of that love.'

Science has much to contribute to the interdisciplinary conversation, through the account that it can give of the process and history of the universe. Its most important insight is the evolutionary concept of the emergence of novelty in regimes where lawful (anthropic) regularity and contingent specificity interact. The interplay of necessity and chance 'at the edge of chaos' (a domain of process characterised by the intertwining of degrees of order with an open sensitivity to small influences) has operated at many levels, from the cosmic evolution of stars and galaxies to the familiar biological story of the developing complexity of terrestrial life.

There is a distorted version of intellectual history that portrays the publication in 1859 of Charles Darwin's *Origin of Species* as being the final parting of the ways between science and religion and the end of any real debate between them. As a matter of historical fact not all scientists immediately accepted Darwin's ideas, nor did all theologians immediately reject them. All had to struggle to take on board the full extent to which the past had been different from the present, and the need therefore to understand that present in the light of its origin in the past. Two Christian thinkers, Charles Kingsley and Frederick Temple, soon coined a phrase that neatly encapsulates how religious people should think about an evolving world. They said that no doubt God could have brought into being a ready-made world, but it had turned out that the Creator had done something cleverer than that in bringing into being a world so endowed with fertility that creatures were allowed 'to make themselves', as that potentiality was brought to birth through evolutionary exploration.

A very important theological idea is connected with this insight. It concerns how God may be understood to relate to the creation. Christian theology believes God's fundamental character to be love. Such a deity could not be supposed to act as a Cosmic Tyrant, pulling every string in a creation that was no more than a divine puppet theatre. The gift of love must always be some due form of independence granted to the object of that love. One of the most illuminating ideas in twentieth-century theology has been the recognition that the act of creation is an act of divine self-limitation – an act of kenosis, as the theologians say – on the part of the Creator in allowing creatures truly to be themselves and to make themselves. This implies that, although allowed by God, not all that happens will be in accordance with positive divine will.

A kenotic understanding of God's relationship with the world affords theology some help as it wrestles with perplexities about evil and suffering, surely its most challenging problem. A world in which creatures make themselves is a great good, but it has a necessary cost. The shuffling explorations of potentiality (which is what 'chance' means in an evolutionary context) will inevitably sometimes have ragged edges and lead into blind alleys. The engine that has driven the fruitful history of life on Earth has been genetic mutation. Yet, if germs cells are to mutate and produce new forms of life, some somatic cells will also be able to mutate and become malignant. The anguishing fact of cancer is not gratuitous, something that a Creator who was more competent or less callous could easily have eliminated. It is the inescapable shadow side of evolving fruitfulness. Far from evolutionary insight being destructive of a helpful debate between science and religion, it has had a very positive influence on theological thinking.

Finally, one should note that science raises another issue that theologians speaking of the world as creation need to consider. Cosmology's ultimate prognosis for the future of the universe is bleak. The timescales are immensely long, but eventually all will end in cosmic futility, either through collapse or, more likely, through the long-drawn-out decay of an ever-expanding, ever-cooling universe. Carbon-based life must eventually vanish from the cosmos. Theology has always striven to take a realistic view of death, whether that of individuals or of the universe. It does not rely upon an ultimately illusory evolutionary optimism, but locates its hope of a destiny beyond death solely in the faithfulness of the world's Creator. A recent development in the debate between science and religion has been an increasing interest in exploring the coherence of such a hope. Significant developments in eschatological thinking have resulted, but there is not space to sketch their details here[2]

Divine Action

Religious believers pray to God, asking for particular help. Theologians talk of God's providential interaction with history. Yet science speaks of the regularity of the causal processes of the world. Does this mean that believers are mistaken and God is restricted to the spectatorial role of holding that world in being? The Abrahamic faiths (Judaism, Christianity and Islam) all speak of God as acting in the world, bringing about particular consequences in particular circumstances.

If science described a mechanical world of cosmic clockwork, as many thought Newtonian physics implied, theology would be limited to the deistic picture of a God who just set the world in motion and then let it all happen. Yet that mechanical picture was always suspect, since human beings do not believe themselves to be automata but consider that they have the basic freedom to act as intentional agents. If the world's future is open to humanity, surely it must be open to its Creator also. In fact, twentieth-century science saw the death of a merely mechanical view of physics. Intrinsic unpredictabilities (an inescapable cloudiness that cannot

2 See Polkinghorne, J.C. *The God of Hope and the End of the World*, London: SPCK / New Haven: Yale University Press (2002).

be overcome by better calculations or more exact observations) came to light, first in quantum theory at the subatomic level, and then in chaos theory at the level of everyday phenomena. What these discoveries imply is a matter for philosophical debate.

The nature of causality is a metaphysical issue. It is influenced by physics but not determined by it alone. For example, while most physicists believe that the unpredictabilities of quantum theory are signs of an intrinsic indeterminacy, there is an alternative interpretation of equal empirical adequacy that attributes them to ignorance of inaccessible further factors ('hidden variables'). The choice between these interpretations has to be made on metascientific grounds, such as judgements of economy and lack of contrivance.

'This does not imply that the future is some kind of random lottery'

Unpredictability is a property concerned with what can or cannot be known about future behaviour. It is a contentious philosophical problem how what we know relates to what is actually the case. Yet those whose philosophy is based on realism, as is the case for most scientists, will see the two as being closely connected. It is then natural to interpret intrinsic unpredictabilities as signs of a causal openness to the future. This does not imply that the future is some kind of random lottery, but simply that the causes that bring it about are not limited to science's conventional account in terms of the exchange of energy between constituents. A plausible candidate for additional causal factors is the exercise of agency, either by human individuals or through divine providential action.

Very active discussion in the science and religion debate has centred on the question of divine action. Without going into the detail of a variety of positions that have been advocated, one can say that at least it is clear that science has not established the causal closure of the physical world simply on its own terms. It is entirely possible to take absolutely seriously what physics has to say and still believe in powers of agency, both human and divine.

A realistic interpretation of unpredictabilities leads to a picture of the universe as a world of true becoming, in which the future is not an inevitable consequence of the past. Instead, many causal factors bring about that future: natural law, human intentional acts, divine providence. If the source of openness is understood to lie in the cloudiness of unpredictable process, events cannot be analysed and itemised in a transparent fashion, as if one could say nature did this, human intentional action did that, divine providence did the third thing.

Reflection on a world of true becoming has led some theologians to rethinking how God relates to time. God is not in thrall to time as all creatures are, and there must surely be an eternally timeless dimension in the divine nature. Classical theology considered this to be the total story, so that it pictured God as wholly outside time, looking down, so to speak, on the whole of cosmic history laid out before the divine gaze, 'all at once'. Yet the God of the Bible is portrayed as One who continually engages with unfolding history, and this is something that can be fittingly supposed of the Creator of a world of unfolding fruitfulness.

Miracle

The issue of miracle is one that frequently surfaces in the debate between science and religion. It is a question that Christianity has to take very seriously, for at the heart of its own theological story is the resurrection of Christ, the belief that Jesus was raised from the dead to an unending life of glory.

Claims of the miraculous go beyond a concept of the Creator at work within the open grain of nature, for they require belief that God sometimes acts in unique ways. Science supposes that what usually happens is what always happens, but this assumption cannot be made the basis for excluding the possibility of unprecedented one-off events. Yet miracles pose a theological problem, for God cannot be supposed to act as a kind of celestial conjuror, making capricious use of divine power in a show-off kind of way. If miracles occur, it must be because unique circumstances have made that a rational and consistent possibility, an event in which a deeper aspect of the divine character is manifested than is normally revealed. In St John's gospel, miracles are called 'signs' in just this revelatory sense.

The presence of the miraculous must be associated with a new regime in creation's history, much in the same way that the exploration of a new regime in the physical world may manifest totally unexpected properties (such as the wave/particle duality of light). Scientists do not instinctively ask the question, 'Is it reasonable?', as if they knew beforehand what shape rationality had to take. The physical world has too often proved too surprising for that to be appropriate. Instead, they ask 'What makes you think that might be the case?', an enquiry at once more open and, in its insistence on evidence, more demanding. Approach to the question of miracle in the science and religion debate has to be along similar lines, not presuming a priori their impossibility, but requiring adequate motivation before accepting belief.

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