'Science *and* Theology' or 'Science *in* Theology'? New Paths in the Encounter of Theology with the Natural Sciences

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Abstract

This article surveys some recent changes and developments in the field of science and theology. Older accounts like that of Ian Barbour, which mapped the field in terms of different kinds of relationship between 'science' and 'religion' (or 'theology'), have been criticized in recent years for giving an over-simplified and misleading impression of the complex and varied encounters between particular scientific and theological discourses. In place of Barbour's schema, I propose a more nuanced way of thinking about how particular theological enquiries might engage with relevant scientific disciplines. One important debate in science and theology, concerning divine action in the natural world, is used to illustrate the proposed approach. The use of this example reveals how new paths have opened up in recent years in this particular debate, in addition to new possibilities for understanding the field as a whole.

Keywords

Barbour, Ian G.; divine action; Knight, Christopher C.; Ritchie, Sarah Lane; science and religion; science and theology; Yong, Amos.

Introduction

In recent years, the study of science and theology has undergone some important changes and developments. As a result, new possibilities have emerged for thinking about the relationship of theology with the natural sciences in creative and interesting ways. In this article I shall explore some of these new possibilities, with particular reference to debates about divine action in the natural world.[1]

Typologies and their problems

One way to understand how the field has changed in recent years is to begin with one of its twentieth century pioneers, Ian Barbour. Among his major contributions was a famous classification or typology of possible relationships between science and religion. He identified four ways of understanding the relationship: conflict, independence, dialogue or integration.[2] Examples of conflict would be atheists such as Richard Dawkins, who claim that science

[1] The argument of this article is developed more fully in Neil Messer, *Science in Theology: Encounters Between Science and the Christian Tradition* (London: Bloomsbury T & T Clark, forthcoming).
[2] E.g. Ian G. Barbour, *When Science Meets Religion* (San Francisco, CA: HarperSanFrancisco, 2000).

discredits religious faith,[3] and believers who reject certain scientific theories on religious grounds, such as young-earth creationists. Independence was exemplified by the paleontologist Stephen Jay Gould, who regarded science and religion as 'non-overlapping magisteria': each has authority in its own domain, but neither should encroach on the other's territory. In dialogue, science and religion might relate constructively to each other while retaining some measure of independence from each other, while integration suggests a closer relationship between the two. Dialogue and integration were the approaches identified with most scholars in the field of science and religion/theology,[4] and Barbour himself favoured integration.[5]

Barbour's typology has had a great influence on the ways scholars have understood the field of science and theology, on the kinds of questions that have been asked and how they were answered. Following Barbour, various other scholars have proposed their own variations or improvements on his typology.[6] However, in recent years, Barbour's typology and others like it have been increasingly criticized. One basic problem is that these typologies suggest two independent entities, one called 'science' and the other called 'theology' (or 'religion'), which may then relate to each other in various ways: they might get into a fight, ignore one another, have a conversation, or attempt to join themselves together. However, this is a misleading image in various ways. Historically, the use of the English words 'science,' 'theology' and 'religion' to represent these independent entities or activities is remarkably recent. As Peter Harrison has argued, it would simply not have made sense to a mediaeval or early modern scholar to talk about how 'science' and 'religion' (or their Latin roots, *scientia* and *religio*) are related to each other.[7] This suggests, for example, that it may be very misleading to think of Galileo's conflict with the Catholic hierarchy as a conflict between 'science' and 'religion.'

A related problem, of course, is that the English terms used by Barbour and his successors might not have exact equivalents in other languages. As is well known, for example, the English word 'science' has a much narrower meaning than the German *Wissenschaft*, but probably broader than more specific German terms like *Naturwissenschaft*.

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[3] See Richard Dawkins, *The God Delusion* (London: Black Swan, 2007).

[4] The field is sometimes referred to as 'science and religion,' and sometimes as 'science and theology.' While these two titles suggest different emphases, and some scholars prefer one or the other, in practice they largely refer to the same area of academic activity. My own interest is in the relationship of Christian *theology* to the natural (and human) sciences.

[5] Ian G. Barbour, *Nature, Human Nature, and God* (London: SPCK, 2002), p. 2.

[6] E.g. Ted Peters, 'Theology and the Natural Sciences,' in David F. Ford (ed.), *The Modern Theologians*, (2nd ed., Oxford: Blackwell, 1997), pp. 649-67; John Polkinghorne, *Science and the Trinity: The Christian Encounter with Reality* (London: SPCK, 2004), pp. 11-32; Mikael Stenmark, 'Ways of Relating Science and Religion,' in Peter Harrison (ed.), *The Cambridge Companion to Science and Religion* (Cambridge: Cambridge University Press, 2010), pp. 278-95.

[7] See Peter Harrison, *The Territories of Science and Religion* (Chicago: University of Chicago Press, 2015).

A further criticism of typologies like Barbour's is that they treat science, religion and theology as essentialist categories.[8] They imply that there is a unified category called 'science' (for example) with a fixed, stable meaning, so that all examples of 'scientific' activity, wherever they are found, will share the same essential characteristics. Not only is this historically inaccurate, as we have seen: it also hardly does justice to the diversity of present-day scientific activity. Particle physics, organic chemistry, evolutionary palaeobiology, molecular genetics and cognitive neuroscience are very different activities with highly diverse methods and approaches. For this reason, it might be over-simplified and misleading to say that when divine action is discussed in relation to quantum physics, when we think about theodicy in the light of evolutionary biology, and when neuroscience raises questions for theological ethics, these are all instances of the same thing: the relationship between 'science' and 'theology.' Perhaps, as John Perry and Sarah Lane Ritchie suggest, one should instead focus on whether, and how, *particular* areas of theological enquiry should engage with *particular* scientific findings or disciplines.[9]

Science *in* theology: a conversation between two voices

In the light of these various criticisms, it might be better to speak of 'science *in* theology.' This would mean asking a different question from Barbour's. Our question would be: What can scientific insights contribute to theological understanding? Or to put it another way: What should theologians be willing to learn (and what should they *not* be willing to learn) from the sciences? Following Perry and Ritchie's lead, rather than asking this question about science and theology as a whole, we can consider it as a question to be asked about particular areas of theological enquiry and the particular scientific fields that might contribute to them.[10]

One can imagine this as a conversation between different voices. If we are seeking an answer to a theological question, or trying to understand some aspect of the world or human life in relation to God, various voices will have things to say about that question or topic. One could be called 'the voice of the Christian tradition': this is a voice rooted in the Scriptures and shaped by the Church's history of reading and reflection on those Scriptures down the centuries. But a particular scientific discipline might also have something to say. The question then becomes:

[8] E.g. Geoffrey Cantor and Chris Kenny, 'Barbour's Fourfold Way: Problems with his Taxonomy of Science-Religion Relationships,' *Zygon* 36.4 (2001), pp. 765-81. For a response, see Ian G. Barbour, 'On Typologies for Relating Science and Religion,' *Zygon* 37.2 (2002), pp. 345-59.

[9] John Perry and Sarah Lane Ritchie, 'Magnets, Magic, and Other Anomalies: In Defense of Methodological Naturalism,' *Zygon* 53.4 (2018), pp. 1064-93.

[10] Of course, one could also ask the reverse question: what can theological insights contribute to particular areas of scientific understanding? In this article, I am considering the science and theology field as a theological sub-discipline, and therefore emphasising what the sciences can contribute to theological understanding. However, it is entirely possible that dialogues of the kind described here could also offer new insights to scientists who are open to them.

How much, and what kind of thing, should each of these voices contribute to our understanding of our theological topic?[11]

An illustration: the question of divine action

We can illustrate this approach by examining a particular topic, which has at times dominated the science and theology field, and continues to be an important area of debate. This is the question of divine action: whether, in the light of modern science, is it still possible to speak of God acting in the world, and if so, how.

If we wish to answer that question, what contribution to our answer might come from the voice of the Christian tradition, and what might a voice from modern physics offer? One possibility is that one voice completely excludes the other. Some physicists might claim that our scientific understanding of the universe demonstrates that there is no God who acts in the world.[12] Alternatively one might say, borrowing Stephen Jay Gould's terminology, that the question of divine action is a theological question, which is not part of the 'magisterium' of science. If so, scientific voices will have nothing to contribute to a theological understanding of divine action. Both of these extreme positions effectively close down any dialogue between scientific and Christian voices, privileging one voice to the exclusion of the other. However, in between these extremes are various possibilities for dialogue between the two voices.

The Divine Action Project (DAP)

During the late 1980s and 1990s, the question of divine action was the focus of intensive study and discussion in a series of conferences and edited volumes, jointly sponsored by the Vatican Observatory and the Center for Theology and the Natural Sciences in Berkeley, California. This research programme is usually referred to as the Divine Action Project (DAP).[13] It has played a major role in shaping not only the divine action debate, but also the science and theology field as a whole. Some of the most influential proposals for thinking about divine action in the light of modern science were either generated, or refined and developed, through the conferences and discussions of the DAP.

One view widely supported by DAP participants was that God acts through non-deterministic quantum mechanical processes. The classical physics of Newton and his successors was deterministic: every event in the world, such as a collision between two objects, will have an effect that can be predicted exactly if one knows the relevant physical laws and the starting

[11] Of course, there may be more than one scientific discipline or 'voice' with something to say. There may also be other voices, such as philosophical ones, with contributions to make to our topic. But to keep things simple, I am imagining this encounter simply as a conversation between two voices.

[12] For example, Victor J. Stenger, *God: The Failed Hypothesis – How Science Shows that God Does Not Exist* (Amherst, NY: Prometheus Books, 2007).

[13] See Wesley J. Wildman, 'The Divine Action Project, 1988-2003,' *Theology and Science* 2.1 (2004), pp. 31-75. Details of the books and summaries of the papers collected in them are available online at http://www.ctns.org/books.html (accessed 09 August 2019).

conditions (the mass of the objects, the velocities with which they are moving, etc.). This understanding of physics lends itself to a mechanistic view of the universe:[14] the cosmos operates like a vastly complex clockwork mechanism, in which every event has a clearly defined physical cause. If this is the case, it seems that divine action is not needed to explain events in the physical world. Moreover, if every event is completely determined by physical causes, it seems that God could not act without interrupting or suspending the physical laws which, presumably, God also established; so divine action in the world might seem to involve God in self-contradiction. This mechanistic view of the universe might seem to have room only for the God of deism, who created the cosmos and left it to run according to its physical laws.

However, this view changed radically around the beginning of the twentieth century, when it was discovered that the 'microscopic' world of atoms and sub-atomic particles does not behave in the same mechanistic way as the 'macroscopic' world of everyday objects. The behaviour of atoms and sub-atomic particles cannot be predicted with certainty by the application of deterministic physical laws, but only described in terms of probabilities. For example, one can say that 50% of the atomic nuclei in a sample of radioactive material will decay in a certain time, but it is impossible to predict when a single nucleus will decay. Quantum mechanics is the name given to the probabilistic, apparently non-deterministic physics of the microscopic world.[15] To many science and theology scholars, quantum mechanics has offered new possibilities for conceiving of divine action: God could act by determining the outcome of otherwise non-determined quantum events.[16] Such divine action at the microscopic level could influence events in the macroscopic world in various ways: for example, the radioactive decay of an atomic nucleus could cause a genetic mutation in an organism's DNA, which could influence the evolutionary history of that species.

Not all DAP participants were persuaded that quantum mechanics offers scope for speaking of divine action. John Polkinghorne, for example, looked instead to chaos theory.[17] This is an area of physics that uses Newtonian laws to describe systems in which the course of events is extremely sensitive to the starting conditions. This means that the tiniest variation in the behaviour of any part of the system can have a very large effect, which makes the behaviour of chaotic systems effectively impossible to predict in a precise way. Many physical systems

[14] Newton himself, however, did not hold such a view: see Christopher Kaiser, *Creation and the History of Science* (London: Marshall Pickering, 1991), pp. 178-87, 191-95.

[15] Not everyone agrees that quantum mechanics is non-deterministic: some interpretations of it claim that the apparently random behaviour of atoms and sub-atomic particles is in fact fully determined by physical laws that we do not yet understand.

[16] For one example of this view, see Robert John Russell, 'Quantum Theory and the Theology of Non-Interventionist Objective Divine Action,' in Philip Clayton (ed.), *The Oxford Handbook of Religion and Science* (Oxford: Oxford University Press, 2008), pp. 579-95.

[17] E.g. John Polkinghorne, 'The Metaphysics of Divine Action,' in Robert John Russell, Nancey Murphy and Arthur Peacocke (eds.), *Chaos and Complexity: Scientific Perspectives on Divine Action* (2nd ed., Vatican City: Vatican Observatory/Berkeley, CA: Center for Theology and the Natural Sciences, 1997), pp. 147-56.

exhibit chaotic behaviour, and Polkinghorne has frequently argued that it is possible to think of God acting to influence the behaviour of chaotic systems.

Many of Polkinghorne's DAP colleagues were skeptical about this claim. Some, such as Arthur Peacocke, preferred to think of God exercising what is sometimes called 'top-down causation' or 'whole-part constraint'. The idea here is that will of God acts as a constraint on the whole cosmos, which has the effect of influencing particular outcomes without God having to intervene directly in those events.

These three proposals by no means represent the whole range of views in the DAP. For all its diversity, however, there was a broad consensus about the ways in which the divine action debate should be structured and approached: (1) Most of the discussion was about 'special divine action' – particular providential acts of God in the world – rather than the 'general divine action' of creating and sustaining the cosmos. This was because contemporary science was thought to present more of a challenge to the former. (2) The consensus was that divine action must be 'non-interventionist': God must act without over-riding or interrupting the laws of nature. (3) Many (though not all) participants were 'incompatibilists': they thought that an event could not be the result of special divine action if it was completely determined by physical causes. This meant that much of the effort in the DAP was devoted to identifying gaps in the causal structure of nature, which would allow room for divine action.[18] Some participants discerned such gaps in quantum mechanics, others in the physics of chaos. (4) Finally, one of the DAP's most important commitments was to allow 'maximum traction' between science and theology, to use Philip Clayton's expression.[19] In practice, as Sarah Lane Ritchie observes, this meant that 'it is *science* that finally determines where and how divine action could possibly occur … in the natural world.'[20]

The DAP did represent a genuine conversation between the two voices that I identified earlier: the voices of the Christian tradition and a scientific discipline. However, if Ritchie's description

[18] This does not mean that the DAP promoted a 'God of the gaps' strategy, proposing divine action as the explanation for anything that science cannot (yet) explain. Dietrich Bonhoeffer was one early critic of this strategy, pointing out that the God of the gaps will be more and more excluded from the world as the gaps in our scientific understanding are filled: *see Letters and Papers from Prison* (Eberhard Bethge (ed.); Reginald Fuller et al. (trans.), 3rd ed., London: SCM Press, 1971), p. 311. A claim about 'ontological gaps,' on the other hand, refers to the causal structure of nature itself: for example, by saying that quantum events really are not completely determined by physical cause and effect. If there are ontological gaps of this sort in nature, they will not be filled by advances in scientific knowledge.

[19] Philip Clayton, *Adventures in the Spirit: New Forays in Philosophical Theology* (Zachary Simpson (ed.), Minneapolis, MN: Fortress, 2008), pp. 54f.

[20] Sarah Lane Ritchie, 'An Elephant in the Room: Why the Causal Joint is Still Worth Talking About,' in Gillian Straine (ed.), *Are There Limits to Science?* (Newcastle upon Tyne: Cambridge Scholars Publishing, 2017), pp. 40-60 (p. 52). See also Sarah Lane Ritchie, 'Dancing Around the Causal Joint: Challenging the Theological Turn in Divine Action Theories,' *Zygon* 52.2 (2017), pp. 361-79.

is correct, it was the scientific voice which dominated the conversation. It was mainly this voice that set the agenda and determined what could and could not be said.

This made it possible for DAP participants to challenge one another's proposals about divine action on apparently scientific grounds. It also laid the whole project open to more comprehensive scientific challenges. For example, Nicholas Saunders has examined most of the main DAP proposals (particularly those based on quantum physics and chaos theory) and rejected them on scientific grounds. He has concluded that 'the prospects for supporting anything like the "traditional understanding" of God's activity in the world are extremely bleak … *it is no real exaggeration to state that contemporary theology is in crisis.*'[21]

The 'theological turn'

Partly in response to such problems, various authors from different theological traditions have begun to approach the question of divine action in different ways from the DAP. One example is the Orthodox theologian Christopher Knight, who draws on the theology of Maximos the Confessor to develop what he calls a 'neo-Byzantine' account of divine action.[22] This account is 'panentheist': it envisages the whole of creation as in some sense 'in God,' though not identical to God. It is also 'sacramental': all created things are oriented towards God's purposes, and this orientation is made particularly 'transparent' in the sacraments, in which created things like water, bread and wine disclose God's purposes for creation especially clearly. To give an account of how God acts in such a world, Knight uses Maximos' distinction between the *Logos* (Word) and the *logoi* (words). The *Logos* is the reason and wisdom of God, at work in all creation since the beginning, which became flesh in Jesus Christ. But all created things have their own characteristic *logoi*, implanted in them by God, which makes them what they are and manifests God's creative purposes for them. According to Knight, this view dissolves the distinction between general and special divine action, because God is always at work in the world through the *logoi.* Knight thinks even miracles can be understood in terms of this account. Miracles are not occasions when God *interrupts* the laws of nature, but the operation of 'laws' that are not scientifically discoverable, through which created things become more *fully* natural: that is, they fulfil God's creative purposes for them more fully.

A contrasting account comes from the Pentecostal theologian Amos Yong, whose account of divine action is pneumatological and eschatological.[23] In Jesus' life, death and resurrection the Holy Spirit was at work, offering a sign and foretaste of God's coming kingdom. The coming of the kingdom will involve a transformation of created reality through the work of the Spirit, in

[21] Nicholas Saunders, *Divine Action and Modern Science* (Cambridge: Cambridge University Press, 2002), p. 215, emphasis original. For a response to Saunders, see Wildman, 'The Divine Action Project,' pp. 47-50, 55-57.
[22] Christopher C. Knight, *The God of Nature: Incarnation and Contemporary Science* (Minneapolis, MN: Fortress, 2007).
[23] Amos Yong, *The Spirit of Creation: Modern Science and Divine Action in the Pentecostal-Charismatic Imagination* (Grand Rapids, MI: Eerdmans, 2011).

ways that cannot be predicted by natural science. Divine actions in the present age, like God's acts in the life, death and resurrection of Jesus, can be seen as signs and 'anticipations of the world to come.'[24]

Ritchie argues that for all their differences, what accounts like Knight's and Yong's have in common is that they give priority to theological, not scientific, categories in forming an understanding of divine action. She and others have referred to this shift towards theological categories as a 'theological turn' in the divine action debate.[25] If that is correct, it suggests another possibility for the conversation between our two voices. The voice of the Christian tradition and the voice of the relevant scientific discipline are again in a genuine dialogue, but now it is the voice of the Christian tradition which plays the dominant role in setting the agenda and shaping the conversation.

Middle paths in the divine action debate

Ritchie's account of the divine action debate, then, suggests that it has tended to follow one of two possibilities: either a scientific voice dominates (as in the DAP) or the voice of the Christian tradition plays the dominant role (as in the theological turn). However, things may not be quite that simple. For one thing, as I noted earlier, the DAP was quite diverse in its participants, and not all of them accepted the majority positions. For example, the Catholic scholar William Stoeger drew on Thomas Aquinas' distinction between 'primary' and 'secondary' causes.[26] 'Primary' refers to God, who is the Creator of all things and the ultimate cause of everything. 'Secondary' refers to causation within the created world, including the kinds of cause and effect that the natural sciences can study. With this distinction, it is possible to speak of something in the natural world being caused both by God (as its primary cause) and by the natural, secondary causes through which God operates. This enabled Stoeger to challenge or revise some of the key assumptions of the DAP.[27] His stated aim was to 'take seriously both revelation and the knowledge of reality we have from the sciences … letting these two areas of our knowledge critically interact and dialogue with each other.'[28]

From the other side, some of the accounts that Ritchie identifies with the theological turn have more continuity with the DAP than they might appear to. Both Knight and Yong, for example, acknowledge their debts to it, even though they move beyond it in their own accounts. By his own account, Yong 'seek[s] to be constrained by the sciences in recognizing the limits of what can be said about divine action within the framework of modern science,' as well as

[24] Yong, *The Spirit of Creation*, p. 93.
[25] Ritchie, 'An Elephant in the Room,' p. 52.
[26] William R. Stoeger, 'Describing God's Action in the World in Light of Scientific Knowledge of Reality,' in Russell et al., *Chaos and Complexity*, pp. 239-61; Denis Edwards, *How God Acts: Creation, Redemption, and Special Divine Action* (Minneapolis, MN: Fortress, 2010).
[27] William R. Stoeger, 'The Divine Action Project: Reflections on the Compatibilism/Incompatibilism Divide,' *Theology and Science* 2.2 (2004), pp. 192-96.
[28] Stoeger, 'Describing God's Action in the World,' p. 261.

'suggest[ing] how theological perspectives invite reconsideration of … notions that have been by and large excluded from contemporary scientific discussion.'[29]

Some voices from both the DAP and the theological turn, in short, seem to be advocating a third possibility for the dialogue: one in which both scientific and Christian voices participate, but neither dominates. Instead both voices play more nearly equal roles in framing the dialogue and guiding the conclusions. Whether or not this interpretation is correct, Ritchie herself seems to advocate such a middle way. She is critical of the DAP for giving scientific perspectives a strong power of veto over theological claims. On the other hand, she also criticizes theological-turn authors for neglecting the question of how 'the transcendent, immaterial God' interacts with the material world; she wants to retain some 'traction' between science and theology.[30]

Conclusion: science *in* theology – new paths and possibilities

Earlier, I suggested that instead of asking how 'science' and 'theology' should relate to one another, it would be better to ask what we should be ready to learn from relevant scientific disciplines when conducting particular theological enquiries. I proposed the image of a conversation between two voices, the voice of the Christian tradition and the voice of the relevant scientific discipline.

By surveying one particular theological enquiry – how to understand divine action in the world – we have discovered a range of possibilities for the encounter between those two voices. At one extreme, the voice of the Christian tradition is excluded, perhaps by a kind of materialism according to which science shows that there is no God. Along the scale from this extreme is a position which allows genuine dialogue between the two voices, albeit one in which the scientific voice dominates. Next is the possibility of a middle position in which neither voice dominates the conversation. Further along is a type of conversation in which the voice of the Christian tradition plays the dominant role in the theological enquiry. At the other extreme, only the voice of the Christian tradition is allowed any role, and scientific voices are thought to have nothing to offer.

Some of these options are more attractive than others, though none is entirely without problems. Elsewhere, in relation to a different theological enquiry, I have argued that the two extremes should generally be rejected, while the second type of encounter, in which the scientific voice dominates, has serious drawbacks. The third and fourth types are more promising, but each is at risk of drifting towards one of the more problematic positions; so each of these two types of engagement may be needed to challenge and correct the other.[31]

Imagining the encounter in this way, as a conversation between two voices, has generated a new kind of typology of science-theology encounters. This typology is different from older ones

[29] Yong, *The Spirit of Creation*, p. 73.
[30] Ritchie, 'Dancing Around the Causal Joint,' p. 377.
[31] Neil Messer, 'Evolution and Theodicy: How (Not) to do Science and Theology', *Zygon* 53.3: (2018), pp. 821-35.

such as Barbour's, and avoids some of their problems. I believe it can help us understand encounters of theology with the natural sciences more clearly, and can offer guidance to those setting up such encounters.

This is an exciting time for the field of science and theology, in which various new paths are opening up. Some of these represent new options for particular debates and areas of enquiry. For example, in the divine action debate, we have seen how the 'theological turn' and the discussion it has provoked have opened up new possibilities that were not so apparent in the days of the Divine Action Project. There are also new ways to understand the science and theology field itself, which could enable a broader and richer range of creative possibilities for theological encounters with the natural sciences.

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