Models for Relating Science and Religion

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Summary

Interactions between science and religion are varied and complex, both historically and today. Models can be useful for making sense of the data. This paper compares four of the major types of model that have been proposed to describe science-religion interactions, highlighting their respective strengths and weaknesses. It is concluded that the model of 'complementarity' is most fruitful in the task of relating scientific and religious knowledge.

Rival models in science often become the focus of vigorous debate. The term 'model' has a rather broad range of meanings within science, but generally refers to one key idea that incorporates a particular set of data in a satisfactory manner. For example, during the early 1950s there were several rival models describing the structure of DNA, the molecule that encodes genes, but in the end the issue was settled by Watson and Crick: the double-helical model in fact provides the best way of describing the structure of DNA[1].

Could there be one single model that in like manner encapsulates the relationship between science and religion? This seems very unlikely. For a start, both science and religion are highly complex enterprises. Furthermore, both are in a constant state of flux. Unlike the unchanging structure of DNA, described by a single well-established model, now discovered, no one all-encompassing model describing the relationship between science and religion awaits discovery. It has therefore been argued, with good reason, that the safest approach when investigating science and religion is simply to describe the complexity of the relationship[2].

Yet life is short and models retain their conceptual usefulness in mapping out ways of relating different bodies of knowledge, useful at least as introductory tools to what is a vast literature. Furthermore, highly vocal advocates continue to sustain the view that a single model *is* sufficient to encompass the science-religion relationship. This paper therefore has two main goals: the first is to present four of the major models whereby science-faith interactions can be visualised and the second to critique the notion that any one of these models is in itself adequate for the task, albeit highlighting one model in particular that has proved to be most fruitful. Fuller accounts, presenting more nuanced collections of models, can be found elsewhere[3].

Defining Science and Religion

Speaking of interactions between two bodies of knowledge already makes the assumption that they are in some way distinct. Such an assumption would have appeared meaningless to medieval scholars for whom theology and natural philosophy were fused into a single overarching body of constructed knowledge. But today, in the English speaking world at least, the term 'science' is commonly taken to refer to 'modern experimental science', an enterprise viewed as clearly distinct from theology, demarcation lines long recognised in the faculty structures of universities. For the purposes of this paper we may define science as 'an intellectual endeavour to explain the workings of the physical world, informed by empirical investigation and carried out by a community trained in specialised techniques'. Defining religion succinctly is notoriously difficult, but for our present purposes it can be defined as 'a system of beliefs relating to transcendent realities concerning purpose and meaning in the world, expressed in social practices'.

About the Author

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Four Models for Relating Science and Religion

Four models are described, highlighting in each case both the usefulness and the inadequacies of the model in encompassing the available data. In the discussion that follows, it is worth remembering that models can play both descriptive and normative roles: they claim to describe what is in fact the case, but are also frequently used to promote what is thought should be the case.

1. The Conflict Model

This model proposes, as the name suggests, that science and religion are in fundamental opposition, and that this has always been the case. The idea is clearly expressed by Worrall when he writes that 'Science and religion are in irreconcilable conflict … There is no way in which you can be *both* properly scientifically minded *and* a true religious believer.'[4] Note both the descriptive and normative elements in such an assertion.

1 Watson J.D. and Crick F.H.C. *Nature* (1953) 171, 737-738.

2 John Hedley Brooke: http://161.58.114.60/webexclusives.php?article_id=590

3 Barbour, I. *When Science Meets Religion*, San Francisco: Harper (2000); Haught, J. F., *Science and Religion: From Conflict to Conversation*, Paulist Press (2005); Stenmark, M. *How to Relate Science and Religion*, Grand Rapids/Cambridge: Eerdmans (2004).

4 Worrall, J. 'Science Discredits Religion', in Peterson, M.L. & Van Arragon R.J. (eds.) *Contemporary Debates in Philosophy of Religion*, Blackwell (2004), p. 60.

Support for the Model

Sociologically there seems little doubt that this model remains popular. For example, in a recent survey of UK Sixth Formers, 29% agreed with the statement that 'science is in conflict with religion'[5]. Their assumptions are nurtured by the media which often favours conflict as a means of grabbing the viewers' attention. Richard Dawkins is a strident supporter of the conflict model, stating: 'I pay religions the compliment of regarding them as scientific theories and … I see God as a competing explanation for facts about the universe and life'[6].

'In general, conflict tends to occur when either science or religion adopts 'expansionist' attitudes'

The idea of conflict is also sustained by the more fundamentalist wings of the Abrahamic faiths that adopt very literalistic interpretations of the Bible or the Qu'ran. In the USA about 40% of the population hold to creationist beliefs[7]. More recently an anti-Darwinian movement known as Intelligent Design (ID) has achieved popularity in the USA, claiming that certain biological entities are too complex to have come about by 'chance', therefore pointing to 'design' as a purported alternative. Both creationism and ID have led to high-profile court cases over what should be taught in US schools. In the more secularised European context, where in any case educational curricula are established nationally rather than by local school boards, as in America, creationist/ID movements have attracted relatively little attention. Nevertheless, the huge influence of the US media plus coverage in science journals has ensured that such local conflicts achieve wide international coverage.

In general, conflict tends to occur when either science or religion adopts 'expansionist' attitudes, purporting to answer questions that rightfully belong to the other domain of enquiry. For example, in his book *Consilience* E.O.Wilson suggests that all knowledge without exception, including religion, can ultimately be transformed into scientific knowledge[8]. Yet many scientists and philosophers maintain that such attempts at scientific expansionism represent an abuse of science, and that the great success of science is due in part to the modesty of its explanatory ambitions.

Earlier generations of writers who promoted the conflict model tended to draw on historical examples in an attempt to support their thesis. Episodes such as Galileo's clash with the Church over the heliocentric theory, and the Church's supposed opposition to Darwinian evolution, used to be cited as exemplars. However, only those very poorly read in the history of science literature now draw on such material in an attempt to support the conflict model. Indeed, as discussed below, the historical literature in general tends to subvert such a model[9].

A critique of the conflict model

Popularity of an idea in the public domain is a poor guide to its truth. Scientific theories are accepted because of supporting data, not by popular vote. Those who wish to assess the conflict model using the stance of a scientist will therefore be more interested in evidence than in popularity.

The fact that the conflict model is largely sustained by polar opposites represented by the more extreme fringes of both the scientific and religious communities, should make one cautious. In fact the number of scientists who specialise in attacking religion in the name of science is a tiny subset of the scientific community as a whole. But with media attention the voice of the extremists becomes well amplified. Polar opposites usually have more in common than they care to admit. A more interesting question, however, concerns the religious beliefs of scientists in general. If the conflict model held some validity, then one might predict a negative correlation between religious and scientific practice. US data, however, suggest that belief in a personal God who answers prayer has remained virtually unchanged at about 40% amongst scientists between 1916 and 1996[10]. Furthermore, in both Europe and the USA a plethora of societies and journals exist for scientists who wish to investigate the implications of their science for their faith, activities that do not indicate any intrinsic incompatibility between science and religious belief[11].

'The ideological abuses of science have contributed much to the conflict model'

The ideological abuses of science have contributed much to the conflict model, but it is important to remember that these ideological investments are not intrinsic to the theories themselves. Instead it is often the case that people try and use the prestige of science, in particular its 'Grand Theories', to support their particular ideology. The fact that Darwinian evolution, for example, has been used in support of capitalism, communism, racism, theism and atheism, should at least give one pause for thought[12].

Perhaps the one fact more than any other that undermines the conflict model is the way in which religious belief has contributed to the historical emergence of modern science. Many of the natural philosophers who played key roles in the founding of our current scientific disciplines were people who saw their faith in God as an important motivation in exploring and understanding the world that God had brought into being[13]. The emergence of specific aspects of the scientific enquiry were nurtured by Christian belief. For example, the empirical (= experimental) attitude that played such a key role in the development of modern science was stimulated by the contingent relationship between God and the created order, whereby the properties of matter could only be determined experimentally, not deduced from first principles. The idea of scientific laws, first clearly articulated in the writings of Newton, Boyle and Descartes, was nurtured by the biblical idea of God as lawgiver. Today no historian of science holds to the view that the conflict model provides a satisfactory overarching framework within which to understand the historical interactions between science and religion. When friction has occurred, it has been more like the occasional quarrels between first cousins, certainly not the kind of enmity that arises from intrinsic incompatibility[14].

2. The 'NOMA' Model

The late Stephen Jay Gould popularised the notion of science and religion as belonging to 'Non-Overlapping Magisteria' (NOMA) in

5 Wilkinson, D. 'Hawking, Dawkins and The Matrix', in Alexander, D. (ed.) *Can We Be Sure About Anything?,* Leicester: Apollos (2005) p. 224.

6 Dawkins, R. *River Out Of Eden*, HarperCollins (1995), pp. 46-47.

7 Miller, J.D., Scott, E.C. and Okamoto, S. 'Public Acceptance of Evolution', *Science* (2006) 313: 765-766.

8 Wilson, E.O. *Consilience - the Unity of Knowledge*, Abacus (1998).

9 For further reading see: Brooke, J. H. *Science & Religion – Some Historical Perspectives*, CUP (1991); Lindberg, D. C. *The Beginnings of Western Science*, University of Chicago Press (1992); Lindberg, D. & Numbers, R. (eds.) *When Science and Christianity Meet,* Chicago University of Chicago Press (2004); Brooke, J. & Cantor, G. *Reconstructing Nature – the Engagement of Science and Religion*, T & T Clark, Edinburgh (1998); Harrison, P. *The Bible, Protestantism and the Rise of Natural Science*, CUP (1998).

10 Larson, E.J. and Witham, L. 'Scientists are still keeping the faith', *Nature* (1997) 386, 435-436. In addition a large survey instigated by the Carnegie Commission of over 60,000 college professors in the USA, approximately one-fourth of all the college faculty, showed that 55% of those involved in the physical and life sciences described themselves as religious, and about 43% as attending church regularly.

11 For example, *Christians in Science* (www.cis.org.uk); the *American Scientific Affiliation* (http://www.asa3.org/); the *International Society for Science and Religion* (http://www.issr.org.uk/), and there are many others; see links at: http://www.st-edmunds.cam.ac.uk/faraday/Links.php.

12 Alexander, D.R. *Rebuilding the Matrix – Science & Faith in the 21st Century*, Oxford: Lion (2001), chapter 7.

13 See citations in Footnote 9.

14 See citations in Footnote 9.

his *Rock of Ages*[15]. Gould maintained that science and religion operate within separate compartments addressing quite different kinds of questions, and therefore there can be no conflict between them virtually by definition. In addition Gould held that science deals with matters of fact, whereas religion addresses questions of ethics, value and purpose. Gould was not the first to hold such a view, but we will use his convenient 'NOMA' label here.

Support for the Model

The best support for the NOMA model is precisely that cited by Gould: science and religion do indeed ask rather different kinds of question about the world. Science is interested in finding mechanistic explanations, those that elucidate how things become as they are, or operate as they do. Science seeks broad generalisations that describe the properties of matter in a way that allows accurate predictions. Science seeks mathematical expressions of data whenever feasible. Experimental testing and reproducibility are critical in the scientific method. Religion, by contrast, is interested in asking ultimate questions; in Leibniz's famous aphorism: 'Why is there something rather than nothing?' Religion wishes to know why science is possible in the first place. In the words of Stephen Hawking: 'What breathes fire into the equations?' Why does the universe go to all the bother of existing? Does life have any ultimate meaning or purpose? Does God exist? How ought we to act in the world? Gould was right – science and religion do indeed ask different kinds of questions.

A critique of the NOMA model

Three main criticisms can be levelled against the NOMA model. The first is historical. Gould himself fatally undermined his own model by writing entertaining essays on key figures in the history of science whose thinking was greatly influenced by their religious beliefs[16]. The constant traffic of ideas between science and religion over the centuries, interactions that continue to the present day, does not support the idea that these human activities lie in separate realms.

The second main criticism rests on the fact that although it is true that science and religion ask distinct types of question about reality, nevertheless it is the same reality that is being addressed in both cases. Science owes its success to the restricted nature of its questions. Nevertheless, even that limited repertoire uncovers facts that to many scientists have religious significance. For example, Professor Paul Davies, a cosmologist who adopts no traditional religious belief, has found that the elegant fine-tuning of the laws that describe the structure of the universe has forced him to consider religious explanations[17]. Such conclusions would be unexpected if a strong version of the NOMA model were correct.

A third problem with the model stems from the rather obvious fact that both science and religion are very human activities. The scientist with religious beliefs working in a research team at the laboratory bench on Mondays is the same person who worships God communally in church on Sundays. Although the two activities are clearly distinct, the brain is simply not designed to compartmentalise different facets of our lives as if they lacked connections. In fact many Christians find powerful synergies between the life of faith and the life of science[18]. Furthermore, religious believers with an evidence-based faith would maintain that their religious beliefs are as factual as their scientific beliefs. Such well-established characteristics of religious thinking and experience do not fit readily with a NOMA model.

15 Gould, S.J. *Rock of Ages*, Ballantine Books (2002).

16 e.g. Gould, S. J. on the Revd Thomas Burnet, author of the seventeenth century work *The Sacred Theory of the Earth* in *Ever Since Darwin*, Penguin Books (1980), ch. 17 pp. 141-146.

17 Davies, P. *The Mind of God: The Scientific Basis for a Rational World*, Simon & Schuster, Reprint edn. (1993); Davies, P. *The Goldilocks Enigma: Why is the Universe Just Right for Life?*, London: Allen Lane (2006).

18 Berry, R.J. (ed.) *Real science, real faith: 16 scientists discuss their work and faith*, Monarch, reprint (1995).

3. Fusion Models

Fusion models represent the polar opposite of the NOMA model in that they tend to blur the distinction between scientific and religious types of knowledge altogether, or attempt to utilise science in order to construct religious systems of thought, or vice versa. The plural 'models' is necessary because the various strategies for achieving fusion are very diverse.

Fusion models in which the flow is from science to religion are favoured more within monist rather than dualist systems of thought. Envisaging knowledge about God (theology) as being distinctive in relation to knowledge about the material order (science) is facilitated in cultures influenced by the Abrahamic faiths, which traditionally perceive God as distinct from his creation. By contrast, in cultures influenced by Hindu and Buddhist monistic systems of thought, in which all knowledge is seen as part of the same ultimate reality, even talk of 'relating scientific and religious knowledge' can itself sound very ambiguous. If all true knowledge is ultimately a part of the same reality, then how can these domains be separate in the first place? This world-view has nurtured books suggesting that quantum mechanics, for example, resonates in a particular way with eastern religious thought, thereby exemplifying the 'fusion' approach[19]. Process theology has some philosophical kinship with monistic systems of thought, and in its 'strong form' exemplifies the fusion model[20]. Coming from the opposite direction, creationists present religious convictions as if they were science, seeking to fuse scientific and religious knowledge by assigning priority to religious beliefs.

Support for Fusion Models

There is such variety within the various attempts made to fuse scientific and religious knowledge that each case needs to be assessed separately, which space does not allow. But in general fusion models have the merit that they usually (but not always) wish to take both science and religion seriously, so seriously, in fact, that they are willing to use the convictions of the one to construct elements of the other. Such attempts need to be distinguished clearly from natural theology, which aims to show that certain properties of the natural world, as revealed by science, point to the existence and/or nature of God. Fusion models go well beyond natural theology in proposing that the actual *content* of science informs the *content* of religious belief and vice versa.

A Critique of Fusion Models

Two main general criticisms can be made of fusion models. The first stems from the important decision made by the founders of the Royal Society, with their motto *Nullius in verba* ('Take no one's word for it'), to focus on natural philosophy and not discuss religion in their proceedings. This was not at all because these early founders lacked Christian convictions – far from it – but rather they recognised that success in the study of God's world required focus on its properties rather than on its ultimate meaning. In retrospect this decision probably played an important role in encouraging the development of science as a distinct body of knowledge about the world, demarcated to a large degree, at least in the contents of its publications, from the worlds of politics and religion. From a pragmatic viewpoint this is a huge advantage. A great strength of the scientific community is that within it people of any faith or none can cooperate in achieving certain limited goals using standardised methods, techniques and publishing outputs. Once ideological or religious 'investment' occurs in a particular theory it becomes more difficult to assess on purely scientific grounds. In addition a great loss of clarity tends to arise when scientific and religious

19 e.g. Zukav, G. *Dancing Wu Li Masters: An Overview of the New Physics*, Harper Perennial Modern Classics (2001).

20 Whitehead, A.N. *Process and Reality: An Essay in Cosmology*, New York: Macmillan (1929). Critical edn. by Griffin, D.R. & Sherbourne, D.W., New York: Macmillan (1978).

concepts are mingled confusingly in the same discourse.

The second general criticism is aimed particularly at attempts made to construct religious beliefs out of current science. The problem with this approach is that science tends to move on very fast. Today's trendy theories are tomorrow's leftovers. Those who construct their religious beliefs based on current scientific theories may find themselves building on sand.

4. The Complementarity Model

This model maintains that science and religion are addressing the same reality from different perspectives, providing explanations that are not in any kind of rivalry to each other, but rather are complementary. The language of complementarity was originally introduced by the physicist Niels Bohr to describe the relationship between the particle and wave descriptions of matter; it was necessary to hold on to both understandings simultaneously to do justice to the data. Since Bohr's time the idea of complementarity has been greatly extended within the science-religion field to encompass any entity that requires explanations at multiple levels in order to explain its complexity adequately.

The classic example is provided by the multiple descriptions required to understand the human individual at the various levels of analysis provided by disciplines such as biochemistry, cell biology, physiology, psychology, anthropology and ecology. None of these scientific descriptions is rival to any others – all are required for our understanding of the complexity of human beings in the context of their environment. A similar complementary relationship exists between brain and mind. Scientific descriptions of neuronal events that occur during brain activity are complementary to the 'I' language of personal agency that reflects the thoughts of the conscious human mind. Ignoring one level at the expense of the other impoverishes our understanding of human personhood.

Within the language of complementarity, religion provides a further set of explanations, beyond the ability of science to adjudicate, that relate to the factual questions of ultimate purpose, value and meaning. There is nothing in such religious explanatory levels that need be in rivalry with the scientific explanatory levels: the descriptions are complementary. Just as it is possible, in principle, to use brain imaging to describe the neuronal activity in the brain of a scientist as she assesses data from her laboratory, pondering the significance of those data for the current theory under investigation, so equally is it possible to carry out the same experiment on someone (it could be the same person) in a different context as they assess evidence for a religious belief. But in neither case could the scientific data generated by brain imaging be used to justify (or not) the ensuing conclusions, which have to be based on the rational assessments made by the person involved. Those personal assessments, and the brain activity described by the scientist that occurs during that process, provide complementary insights into what is arguably a single reality. But both accounts are essential to do justice to the phenomenon.

Support for the Complementarity Model

The model has the great advantage that it takes both scientific and religious explanations very seriously, doing justice to both. It does not fall into the trap of naïve reductionism in thinking that scientific explanations are the only ones that matter, but is willing to consider the broader, ultimate questions that lie beyond science, yet without at all demeaning the value of scientific knowledge in the process. At the same time the model tends to subvert fusion models on the grounds that they either invest scientific theories with unjustified religious implications, or that they incorporate religious beliefs inappropriately in a scientific context, when in reality the situation demands the type of multilayered set of explanations that the complementarity model provides. The model also subverts the scenario envisaged by Dawkins, quoted above, in which scientific and religious explanations are deemed to be rivals.

A Critique of the Complementarity Model

Two main criticisms have been levelled against the model. The first is that it can too readily slide into a form of the NOMA model by default, thereby escaping the hard task of bringing apparently irreconcilable data together into a unified theory. This is a valid criticism addressed by Donald MacKay who suggested that complementary explanations are justified 'only when we find both are necessary to do justice to experience'[21].

The second criticism is that the model can give the impression that science is the realm of objective truth and facts, whereas religion is the realm of subjective convictions and values. Yet there is no reason in principle why complementary moral and religious descriptions cannot be seen as factual as scientific descriptions. For example, we may accept as a moral fact that rape and cannibalism are wrong. If we accept such statements as moral facts, then it does not seem irrational to argue that such moral or religious dimensions in our complementary descriptions of reality can be as factual as the various scientific levels of description.

Conclusions

There is no single model that adequately encompasses all the complexities that characterise the varied interactions between science and religion. Nevertheless, one model clearly seems more useful than the others. For those interested in data rather than rhetoric, the conflict model lacks plausibility, although its exclusion does not at all imply an absence of occasional friction. Equally the NOMA model fails to convince, at least in its strong form. Fusion models run the risk of blurring the boundaries between different bodies of knowledge that are best kept distinct to facilitate clarity. The complementarity model does not encompass all science-religion interactions, but is valid for many, recognising that reality is multilayered. Those who think that the knowledge provided by their own speciality is the only knowledge that matters, should broaden their minds and not be so parochial.

21 MacKay, D.M. *The Open Mind*, Leicester: IVP (1988), p35.

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