CHAPTER 1

The Road Less Travelled – Science and the Christian Faith

If, as McGrath suggests, the natural sciences represent the contemporary handmaid of Christian theology – following a similar role for philosophy in the ancient world and the social sciences in the modern world1 – then it may not be inappropriate to propose one particular doctrine of Christian theology as a handmaid to a more sympathetic engagement between scientific theology and pastoral theology. It is the purpose of this book to critically examine one such doctrine, that of the Trinity, with a particular focus on the theological construct of perichoresis, which (as we shall see in Chapter 3) conveys the richness of mutuality, reciprocity and interconnectedness discernible not only in the divine life of the triune God of grace, but also in all created reality, both human and non-human.

As an expression of inner-trinitarian life, perichoresis is a term that shifts us away from the static language of persons to the dynamic language of relationships. Defined thus in terms of relational interconnectedness and movement, the concept may be helpful at a number of levels of reality, as well as between those levels. As a theological doctrine, it is helpful as a way into understanding the communion of being and action which is at the heart of the life of the Trinity. Pastorally, perichoresis is significant in expressing the relationship between God and human beings, who are invited to participate in the divine life: this expression of dynamic participation in a trinitarian life of relations opens up the way for interpreting the life of the church as well as the nature of pastoral practice in perichoretic language. But we can go further by considering the concept scientifically, or, more specifically, cosmologically: increasingly scientists perceive the cosmos as a coherent whole, in which the notion of perichoresis may be viewed as a principle of cosmological unity and interconnectedness. So we recognise three significant – and interrelated – perspectives for examining the doctrine of perichoresis: theological/trinitarian, pastoral/ecclesial and scientific/cosmological.

The Shape of ‘Scientific Theology’

The aim of this chapter is to examine the strides that have taken place in the emerging field of science and religion over the past four decades, ever since Ian Barbour, the doyen of contemporary writers in the field,2 published his landmark book, Issues in Science and Religion.3 In the first volume, Nature, of A Scientific Theology, in which Alister McGrath “aims to examine, critically yet appreciatively, the way in which the working assumptions and methods of Christian theology and the natural sciences interact with and illuminate each other”4, the author raises the critical problem of transient theological trends. He identifies two writers who have made significant contributions to the current dialogue between theology and the natural sciences – Ian Barbour and Arthur Peacocke – and argues that both are guilty of succumbing to “significantly weakened variants of the classic statements of Christian orthodoxy.”5

A similar point is made with regard to the provisionality of scientific conclusions. Thomas Torrance, arguably the greatest twentieth-century British theologian, reprimands those scientists whose Promethean attitudes lead them to “extend their knowledge of contingent processes beyond the

5 Ibid: 37. McGrath singles out Ian Barbour for special criticism (contra Polkinghorne!) in this regard, taking exception to “the disproportionate extent to which he relies upon process theology in the course of his analysis” (ibid: 38). Hence the particular attention paid by McGrath in his text to the classic themes of Christian theology explored by such theologians as Athanasius, Augustine, Aquinas and Barth, as well as to the central philosophical themes of Plato and Aristotle.
boundaries of what is createfully, contingent and relative.”

Later in this chapter we will refer to the philosophical concept of critical realism, which acknowledges that scientific – and theological – observations or understandings are predicated on a ‘real world’, whether physical or spiritual, but that our knowledge is necessarily finite and theory-laden and therefore only partial (though quite possibly very close approximations to) representations of reality. In other words, neither theology nor science can claim to be infallible conveyors of all that there is to see and know.

This insight is of critical importance for McGrath because it exposes the fallacy of relying upon either transient revisionist theologies or allegedly secure scientific conclusions in exploring the relationship between theology and the natural sciences. This is not to imply that McGrath eschews any theological position: he is adamant that “the classic Christian formulations of faith are perfectly adequate to function as the basis of a scientific theology.” So the term ‘scientific theology’ is offered as an expression of the methodological parallels between theology and the natural sciences. In this way, McGrath avoids the temptation to ground his work in the sort of naïve realism that has characterised some approaches to the scientific enterprise, whilst in the same vein acknowledging what Peacocke describes as “our incapacity ever to express in human language the nature of that ultimate Being who is called ‘God’.”

Following McGrath, scientific theology may therefore be defined as that project which seeks to identify and examine the common epistemological ground between Christian theology and the natural sciences as they seek to interpret the nature of reality. However, this procedural definition, which eschews reliance upon both contemporary theological trends and the agreed consensus of the scientific community, should not blind us to the plausibility that valuable insights may be gained by serious reflection upon the substance of contemporary thinking and outcomes in both disciplines. A major proposition sustained throughout this book is that whilst both theology and science are ‘works in progress’, theologia viatorum and scientia viatorum, such that their relationship at any one time reflects the unique and particular demands of social or historical circumstance, each may generate data or insights which enrich the other, even pointing us towards a rational and orderly coherence present in all reality. It is helpful therefore to widen the scope of scientific theology to allow for this possibility, without in any way diminishing McGrath’s caveat regarding the provisional nature of both theology and the natural sciences.

McGrath’s suggestion that the natural sciences represent a convincing ancilla theologiae, following the earlier contributions of philosophy and the social sciences as ‘profitable dialogue partners’, epitomises the sort of cultural and interdisciplinary engagement that Christian theology needs if it is to survive as more than just an academic discipline. If the modern era “has suffered a culture split where understanding (Verstehen) has been separated from explanation (Erklären) with the result that questions of meaning have been isolated from questions of nature and behaviour”, it is even more urgent that theology does not retreat into its own corner, but identify appropriate ‘dialogue partners’ in its quest for relevance in today’s world. The discipline of the natural sciences is one such partner, for a number of important reasons, which will be outlined shortly. In a fascinating review of three recent books exploring the relationship between science and religion, Margaret Wertheim titles her article

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7 In his assessment of the postmodern view of science and the contemporary undermining of the epistemological foundations of the scientific enterprise, Denis Alexander concludes that “the stance of ‘critical realism’ provides an appropriate middle way between the Scylla of naïve realism and the Charybdis of systematic relativism”: see Alexander, Denis, Rebuilding the Matrix: Science and Faith in the 21st Century, Oxford: Lion Publishing, 2001: 461.
11 McGrath is critical of the value of the social sciences as a valid ancilla theologiae: “Precisely on account of their radical and often aggressive commitment to a naturalistic world-view, the social sciences offer a skewed perspective on religion which, in the first place, refuses to acknowledge an ancillary role to theology, and, in the second place, denies the entire legitimacy of the theological project, as this is traditionally conceived.” (McGrath, A Scientific Theology, Vol I – Nature: 15).
“The Odd Couple”, subtitled: “Can science and religion live together without driving each other crazy?”13 In this chapter we will offer some responses to this question. But the title of the article betrays a narrower perspective than that envisaged in this book, which is that a contextually-aware practical theology cannot ignore explicit engagement with the natural sciences if it is to have contemporary relevance in the practice of ministry.

This proposition widens the dialogue into a ‘trialogue’, a three-way conversation between theology, science and pastoral ministry. The goal of this conversation is apologetic, and is predicated on a number of observations. Firstly, there is a growing awareness within the Christian community of the impact of science and technology on contemporary life, particularly in terms of the ethics of new scientific capabilities, such as genetic engineering. Human beings, for example, have engaged in intentional genetic modification at the agricultural level for many years, often resulting in such damaging environmental consequences as deforestation, pesticide pollution and the narrowing of plant and animal gene pools. Haught comments that “religion and theology have the reputation of not caring very much about the welfare of the natural world.”14 In the next chapter we shall note that a pastoral theology that has no place for a sacramental understanding of the world of nature is a deficient theology; moreover, a comprehensive theology of imago Dei requires a healthy and positive interaction between human beings and their environment.

Ronald Cole-Turner observes that with the technology of genetic engineering now available to meet human objectives, something new has taken place: “While the chemical processes of natural recombination are billions of years old, and while they occur naturally and all around us and even inside us, as technology — conscious, intentional, and purposive — genetic engineering or artificial recombination is new.”15 This means that “our choices have skewed the value-neutrality of the microbiological in the direction of our values and desires.”16 The speed with which this has happened, with the consequent lack of time to adequately discuss the issues involved, has created tensions and difficulties between scientists and the general public (and within the scientific community as well) both in terms of ethics and in the context of public policy and legislation.17 Recent developments in the contentious area of human cloning have generated the most vocal opposition, and the pastoral responsibilities of the Christian community obligate it to engage with scientists more urgently than ever before.

A second reason why those engaged in pastoral ministry need to dialogue with the scientific community is grounded in the historical relationship between science and religion. In their respective typologies of the science-religion relationship, both Barbour and Haught adopt the word ‘conflict’ to describe the assumed (and, in some cases, actual) position of irreconcilable difference, even to the point of ‘warfare’.18 The general impression gained by many people today is that science and religion are diametrically opposed: science deals with facts and religion deals with – to put it as charitably as possible – untestable dogma. Some would want to subvert the religious perspective as so much ‘supernatural mumbo-jumbo’,19 hardly consistent with the scientific age in which we now live. We noted earlier the presence of social and historical factors which shaped the particular contexts within which the relationship between science and religion was played out over time. Citing the example of Galileo in his relations with the Roman Catholic Church, Brooke reminds us that because both science...

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15 Cole-Turner, R. The New Genesis: Theology and the Genetic Revolution, Louisville: WJKP, 1993: 42, author’s italics. By ‘natural recombination’, Cole-Turner means the continuous activity of a range of chemical processes, involving such natural agents as restriction enzymes, ligases, plasmids and viruses, which cut and splice the DNA of all organisms, creating the genetic variety implicit in biological evolution.


18 See Barbour, When Science Meets Religion: 10-17; and Haught, Science and Religion: 9-12.

19 Typical of this view would be the writings of the neo-Darwinist reductionist Richard Dawkins, the Charles Simonyi Professor in the Public Understanding of Science at Oxford University, in such books as The Blind Watchmaker, New York: W.W. Norton & Co., 1986; River Out of Eden, New York: Basic Books, 1995; and Climbing Mount Improbable, New York: W.W. Norton & Co., 1996.
and religion “are rooted in human concerns and human endeavour, it would be a profound mistake to treat them as if they were entities in themselves – as if they could be completely abstracted from the social contexts in which those concerns and endeavours took their distinctive forms.”

The two have not been pitched against each other over the centuries, as some would like us to believe. It has often been claimed that were it not for the stimulus provided by early Christian thinkers in the sixteenth and seventeenth centuries, then scientific endeavour would not have been so rapid.

The warfare motif has its origin in two books among many spawned by the Darwinian controversy. The first is Draper’s History of the Conflict between Religion and Science, published in 1875, followed twenty years later by White’s A History of the Warfare of Science with Theology in Christendom. Both were avowedly anti-Christian, heavily influenced by humanistic reasoning, and intent on demolishing any support for what they regarded as a bigoted ecclesiastical establishment. However, despite the sometimes poor documentation and obvious prejudice of the Draper-White thesis, as well as its eventual rejection by most respected historians of religion and science, it contained (unfortunately) a sufficient measure of truth to sustain its influence and to color the views of many in both the scientific and the religious communities. Its influence continues to this day.

For this reason, if for no other, pastoral theologians need to focus their sights on a more sympathetic engagement with those in the scientific community in order to combat the (sometimes substantial) residual prejudice in the minds of many Christians against the contribution of the natural sciences to an understanding of what it means to live as human beings in God’s world. In the process, as we shall discover later, the natural sciences have much to gain from the insights of theology.

A third reason in favour of a three-way conversation between theology, science and pastoral ministry is essentially apologetic, relating to the nature of pastoral ministry as an incarnational imperative: those who are engaged in Christian ministry of all types need to be more adequately informed about the culture in which they seek to serve, a culture in which the scientific worldview is a dominant feature. Authentic Christian ministry, as we shall develop in Chapter 2, is expressed most helpfully in terms of participation in the Spirit-empowered ministry of Christ in the world. So the Lord of creation graciously invites us to participate in his glorious creative energies, which are manifestations of his creative and reconciling ministry in the world. To be uninformed about the scientific understandings of the nature of reality, both human and non-human, may therefore result in forfeiting useful apologetic insights. This is a perspective which is grounded in the Christian doctrine of creation: “If God made the world, which therefore has the status of being ‘creation’ as well as ‘nature’, it is to be expected that something of the character of God might be disclosed through that creation.”

In Chapter 3 we shall see how this might be explored within a trinitarian understanding of God as a relational being of love who invites human beings into the dynamic life of his perichoretic being-in-community, a life that ‘spills over’ into all created reality: the pastoral and apologetic implications of such a perspective are evident.

The three reasons elaborated above for a three-way dialogue between systematic theology, scientific theology and pastoral theology – the ethical/pastoral implications of scientific advances, the corrective to historical misunderstandings for the mutual benefit of both science and theology, and the potential apologetic opportunities in pastoral ministry – point to the value of a project which seeks to integrate insights from all three disciplines. This present work is predicated on the hypothesis that there is a significant ‘gap’ between the practice of ministry within the Christian faith community and the insights of the scientific community. The hypothesised neglect of scientific insights within pastoral ministry will be examined in Chapter 2, drawing on a thorough review of pastoral theology literature published during the second half of the twentieth century. In Chapter 3 trinitarian theology, and its associated perichoresis construct, will be presented as a fruitful avenue for encouraging a more constructive engagement between those who are involved in pastoral ministry and those whose energies are devoted to the science-theology interface. The remainder of this chapter traces the key elements in that interface.


22 Worthing, Mark W., God, Creation and Contemporary Physics, Minneapolis: Fortress, 1998: 23.

Clarifying Terms

Science is typically defined as the attempt to understand the world of physical reality (as distinct from ideas) through what has been called the scientific method, an empirical process that involves such things as observation, data-gathering, experimentation and theory formulation. But it is far too simplistic to propose the existence of a single unique scientific method – scientists use a cluster of procedures and practices in their work, and their approaches are almost always coloured by personal presuppositions and motivations. In his historical survey of the science-religion debate, Brooke points to “the diversity, the subtlety, and ingenuity of the methods employed, both by apologists for science and for religion, as they have wrestled with fundamental questions concerning their relationship with nature and with God.”

Alongside differentiation in methodology, therefore, we need to understand the scientist as a person before we can fully understand the science he or she may be doing. It is also important to avoid the oversimplified notion that the conversation between science and theology is concerned about the relationship between ‘science’ and ‘religion’ in a singular sense. We usually find ourselves talking of ‘the sciences’ in the plural: so biology, cosmology, physics, neurology and psychology. Moreover, as a discipline, science cannot be viewed in isolation from other disciplines, such as philosophy or anthropology. It is often held that science is distinct from the subjectivity of other disciplines like philosophy or theology because it is concerned with physical, measurable data only – that which you can observe, touch, taste, feel – in other words, it is concerned with empirical analysis. But science has an interest in other fields of enquiry that do not easily lend themselves to measurement or quantification, such as the spread of bacteria in the environment, or psychological enquiries into human behaviour.

One further example may suffice, drawn from the recent science of ‘sociobiology’, which explores the relationship between culture and evolution. E. O. Wilson – the principal architect of sociobiology – argues that such cultural features as altruism and religious belief are present in human society because they are effective in ensuring the survival of the human gene pool. Many have disputed Wilson’s strong reductionist line, insisting that human beings are not rigidly determined ‘from below’: “It is in those regions left unspecified by chemistry that the emergent freedom of life, mind, and soul are given a very real place in our evolving universe.” Accordingly, it is better to define science in terms of its intent to explain, rather than just measure: and that means that science necessarily has to integrate with other disciplines.

The example quoted above indicates that some scientists recognise that there are important connections between what we observe physically around us and what is unobservable, such as the concept of the human soul … or even the ‘soul’ of the universe, a theme which we will explore more fully later in this book.

As for science, we cannot talk of religion as if we were describing one single uniformly-accepted set of beliefs. Some would argue that all of life is religious, in the sense that we are all concerned about finding some way of organising and directing our lives. There is some validity in that perspective – philosophers are basically addressing the age-old human question: “How can I obtain a worthwhile life?” (which is what the Greek philosopher Aristotle described as summum bonum, the ‘highest good’). The renowned theologian, Albert Schweitzer, brought philosophy and religion together, writing that “the religious world-view which seeks to comprehend itself in thought becomes philosophical … On the other hand a philosophical world-view, if it is really profound, assumes a religious character.”

We recognise a very broad definition of religion here. Albert Einstein, a self-confessed atheist,

24 Brooke, Science and Religion: 5. “Such is the richness of the subject.” Brooke goes on to write, “that it is well to set aside one’s preconceptions.” Recognising the diversity within the natural sciences, McGrath considers three areas of scientific research – cosmology, biology and psychology – noting that each “has a quite distinct way of understanding its goals, evaluating evidence and formulating research strategy”: see McGrath, Alister E., Science and Religion: An Introduction, Oxford: Blackwell, 1999: 178.


26 Haught, Science and Religion: 90.


admitted that he was a ‘religious man’, in the sense that he acknowledged and revered the ‘mystery’ of the universe. So an atheist can be a religious person. Perhaps, then, it is more helpful to think of religion as a set of beliefs, or faith, in a personal “God”, the sort of God we associate with the universal faiths of Judaism, Christianity and Islam. Reflection on such religious faith we may call ‘theology’.

McGrath notes the problems associated with defining the term ‘religion’, concluding that “there appears to be at least some measure of genuine agreement that religion, however conceived, in some way involves belief and behaviour linked with a supernatural realm of divine or spiritual beings.”

This substantive view of religion contrasts with the functional view, which emphasises personal experience and the role of ritual within a sociocultural context. Barbour identifies six types of religious experience which recur in a variety of traditions around the world: numinous experience of the holy, mystical experience of unity, transformative experience of reorientation, courage in facing suffering and death, moral experience of obligation, and awe in response to order and creativity in the world. All occur in the context of a community, the members of whom are strengthened in their beliefs through stories and rituals. Religious beliefs, therefore, are closely related to the cultural life of a community. Hoebel defines culture as “the integrated system of learned behaviour patterns which are characteristic of the members of a society and which are not the result of biological inheritance.” So culture is a social concept, reflecting patterns and rules that arrive through consensus over a period of time. All religions, whether they are the great monotheistic faiths of Judaism, Islam and Christianity, or indigenous, localised belief systems, are culturally-determined within a historical framework. This suggests that when we talk about religion, we are talking about a dynamic and contextual experience amongst particular groups of people. The question of the relationship between science and religion is therefore even more problematic, especially in the light of Cobb’s assertion that there is no such thing as ‘religion’: “[t]here are only traditions, movements, communities, people, beliefs, and practices that have features that are associated by many people with what they mean by religion.” Even within the Christian tradition, there is enough diversity to confound any attempt to propose a consensus view of the relationship between science and Christianity.

Our thoughts about science and religion lead us to the conclusion that neither are fixed, complete disciplines – in fact, they are evolving, open to change and revision. This suggests that both scientists and theologians should adopt an attitude of humility, willing to learn and change.

Connecting Science and Theology

One perspective from which to view alternative approaches to the science-religion debate is to ask the question: What sort of thinkers are we? In other words, is our instinct to start with a particular phenomenon or experience and seek to build our understanding of reality from that? (the ‘bottom-up’ approach)? Or do we prefer to start with broad, general principles, and then work downward from there (the ‘top-down’)? The two approaches need not imply conflict, because they are both, in different ways, tackling the same sort of questions. Both are attempting to get to grips with the nature of reality. The “bottom-up” approach relates closely to the scientific way of looking at things. “Bottom-up

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32 For an excellent assessment of four major schools of thought in the modern period – Liberal Protestantism, Modernism, Neo-Orthodoxy and Evangelicalism – and their respective interaction with the natural sciences, see McGrath, Science and Religion: 31-44; the variety of positions held within these school of Christian thought are epitomised in McGrath’s statement that “Liberal protestantism has tended to have a very positive attitude towards the natural sciences, whereas Neo-Orthodoxy has tended to insist that religion and science belong to totally different spheres of activity.” (Ibid: 31).

33 For example, a ‘bottom-up’ thinker observes the changing weather patterns in a particular location, and then probes to see what they might say to us about the world in which we live. Another example would be the investigation of strands of DNA in order to contribute to an understanding of what it means to be a human being. ‘Top-down’ thinking works in the opposite direction. Christians believe in a God of love who has made all things well. They might also want to assert that God acts in certain ways in the world (though there will be disagreement among Christians as to how exactly he acts). These fundamental beliefs then influence how events or experiences such as earthquakes, shooting stars and human suffering are interpreted.
thinkers “feel it is safest to start in the basement of particularity and then generalize a little.”34 The ‘top-down’ approach presupposes some form of metaphysical framework – such as a Christian theistic framework – within which to interpret the nature of reality. The theoretical physicist-cum-Anglican priest John Polkinghorne is a ‘bottom-up’ thinker, who instinctively builds up from observable phenomena in the “one world of human experience and human understanding that we are trying to come to grips with.”35

Science and religion are both motivated by our experience of the world, and seek to answer questions like: What sort of world do we live in? How does it work? However, religious belief and scientific belief are not the same. Polkinghorne suggests the following difference between them:

In science, we are in contact with the physical world treated as an object, treated as an “it”, open to us to manipulate through the marvellous resource of the experimental method ... But religion is part of a broad spectrum of personal encounter with reality. In that domain of our experience, testing has to give way to trusting.36

In common with other Christian scientists, Polkinghorne argues that we cannot simply reduce the amazing complexity of creation to purposeless physical matter. There has to be more behind it all, he claims. How do you explain the amazing power we have to understand the physical world? The Adelaide physicist Paul Davies acknowledges that there must be a Mind behind everything scientists see, although his perception inclines towards the demur of classical Platonic thought rather than the God of classical Christian theism.37 And human beings somehow have a mind to grasp this amazing reality, reminiscent of Einstein’s famous remark that ‘the only incomprehensible thing about the universe is that it is comprehensible.’

Polkinghorne’s second argument for the existence of a creative and purposive Mind behind creation has to do with the remarkable characteristics of the laws of nature, summed up in the well-known ‘anthropic principle’, which proposes that the whole cosmos, right from the very beginning, was ‘fine-tuned’ in such a way that life as we know it today would not have been possible if conditions had been ever so slightly different.38 Further arguments are presented, such as the presence of beauty in the

36 Ibid: 2; this statement needs to be modified in the light of our earlier comment that scientists are beginning to grapple more seriously with metaphysical concepts like the human soul. Later on in this chapter we will recognise important points of correspondence between science and religion: Fuller makes reference to a continuous scale with knowledge at one end and belief at the other, suggesting that “[s]cience tends to yield us information that is nearer to the ‘knowledge’ end of the scale, and theology tends to yield us information that is nearer to the ‘belief’ end of the scale, but in fact there are elements of knowledge in theological statements and elements of belief in scientific statements ... Scientists are to a certain extent necessarily ‘believers’, and believers are to some extent necessarily ‘scientists’.” (Fuller, Michael, Atoms and Icons: A Discussion of the Relationships Between Science and Theology, London: Mowbray, 1995: 29).
37 See, for example, Davies, Paul, The Mind of God: Science and the Search for Ultimate Meaning, London: Penguin, 1993, in which the author states that he belongs to “the group of scientists who do not subscribe to a conventional religion but nevertheless deny that the universe is a purposeless accident. Through my scientific work I have come to believe more and more strongly that the physical universe is put together with an ingenuity so astonishing that I cannot accept it merely as brute fact. There must, it seems to me, be a deeper level of explanation. Whether one wishes to call that deeper level ‘God’ is a matter of taste and definition. Furthermore, I have come to the point of view that mind — i.e. conscious awareness of the world — is not a meaningless and incidental quirk of nature, but an absolutely fundamental facet of reality. That is not to say that we are the purpose for which the universe exists. Far from it. I do, however, believe that we human beings are built into the scheme of things in a very basic way.” (Ibid: 16, author’s italics).
38 Specifically, the anthropic principle proposes that astrophysical conditions such as the force of gravity, the density of the cosmos, the rate of expansion of the universe, and values attributed to particles in the cosmos all cohere in such a way as to provide an unexpectedly welcoming place for human habitation. The strong anthropic principle insists that into the picture we have to introduce the mind. Human beings with their conscious and complex minds are the result of the universe being as it is: if the universe had been any different — younger or older — life as we know it would not have come into being. Haught puts it this way: “If there was ever to be anything like mind, therefore, an incredibly delicate balancing of the numerical values of gravity and cosmic expansion was required at the very beginning of the universe.” (Haught, Science and Religion: 127, author’s italics). For a helpful discussion of the anthropic principle in its weak and strong variants, see Alexander, Rebuilding the Matrix: 407-425.
world, the source of moral choice, and the reality of spiritual encounter, or worship. For Polkinghorne, as for others, science has little to offer in these areas. These intimations of beauty, ethics and worship in our human experience of reality mean that not only must we make connections between science and theology, but we also need to draw art and spirituality into the wider picture.\textsuperscript{39} They suggest to us that behind the extraordinary physical reality, of which we are a part, there is a God who wills it all into existence. The universe has purpose.

Polkinghorne highlights the necessity for dialogue between science and theology by articulating eight assertions that reflect the essential inter-dependence between science and theology.\textsuperscript{40} His first assertion is that both science and theology are concerned with the rational exploration of what is the case: all scientists are interpreters in their search for an understanding of the nature and pattern of the physical world. This means that they must necessarily be open to correction. Likewise, the theological enterprise also involves wearing “spectacles behind the eyes”: as Christians we also need to be willing to allow our theology to be shaped as we go along.\textsuperscript{41} Secondly, the physical world testifies to marvellous and transparent rationality: there is beauty and elegance in the mathematical equations and patterns that describe the universe. The Christian parallel to this rational mathematical harmony is found in the concept of the Logos, a Greek word that refers to ‘divine rational order’, conveying coherence and order, and embracing reason or Mind. The Creator God is a rational God. Science and theology converge here in presenting an understanding of ultimate reality that “is shot through with signs of mind.”\textsuperscript{42}

Polkinghorne’s third assertion is that the universe is rich in fruitfulness because it is both historically fine-tuned (the ‘anthropic principle’ noted above) and theologically ‘free’. Scientists have demonstrated that a universe as large as ours needs a very long history – perhaps 15 billion years – to bring into being the nuclear furnaces of stars that produce the carbon and oxygen necessary for human life. Theologically, we might interpret the process of evolution as the history that is necessary for the Big Bang to become God’s fruitful universe that we know today.\textsuperscript{43} Through a divine mix of regular and reliable (but not rigid) laws of nature, and irregular and unpredictable happenings (what we might call the ‘chance’ that is implicit in natural selection), God in self-limiting love allows his creation to evolve with the freedom with which he endows it. So ‘chance’ is God’s gift to his creation: it is the gift of independence and freedom. Fourthly, suggests Polkinghorne, the physical world is endowed with an open future that allows for God’s providential action. In 1961 Edward Lorenz, Professor of Meteorology at Massachusetts Institute of Technology, accidentally discovered the so-called ‘butterfly effect’ in his computer simulations of weather patterns.\textsuperscript{44} The phenomenon, technically known as ‘sensitive dependence on initial conditions,’ gave rise to the sciences of chaos and complexity, competitors to the predictable ordered linearity assumed in scientific activities.\textsuperscript{45}

Alexander points out that ‘chaos’ is somewhat of a misnomer, “since chaos theory demonstrates how different ordered systems can arise from such different starting conditions.”\textsuperscript{46} Likewise, Gleick describes the ‘butterfly effect’ as “order masquerading as randomness.”\textsuperscript{47} The lesson to be learned

\textsuperscript{39} With regard to moral choice – and, we might want to add, in the light of the events surrounding September 11th 2001 – Polkinghorne speaks about the “irreducible ethical element” present in our understanding of reality.

\textsuperscript{40} See Polkinghorne, \textit{Serious Talk}: 34-59.

\textsuperscript{41} The essential difference between science and theology here is that science deals with repeatable phenomena, whereas theology usually deals with unique experiences; this is because science is concerned with impersonal material, whereas theology has to do with personal divine Reality. This echoes the insights of the Jewish mystical philosopher Martin Buber, who once distinguished between two different types of knowledge, “It” and “Thou”: see Buber, Martin, \textit{I and Thou}, translated by Ronald Gregor-Smith, New York, Charles Scribner’s Sons, 1958.

\textsuperscript{42} Polkinghorne, \textit{Serious Talk}: 50.


\textsuperscript{45} Although, as Haught points out, we should not “trivialize or dismiss linear science, for without it we would have little control over our technological projects.” (Haught, \textit{Science and Religion}: 144-145). Without the predictability and exactness implicit in linear science, major engineering and technological schemes would be impossible.

\textsuperscript{46} Alexander, \textit{Rebuilding the Matrix}: 335, author’s italics.

\textsuperscript{47} Gleick, \textit{Chaos}: 22, author’s italics.

\textsuperscript{48} See Wilkinson, David, \textit{God, the Big Bang and Stephen Hawking}, Tunbridge Wells: Monarch, 1993, for an introduction to the basic principles of quantum mechanics; see also Barbour, \textit{When Science Meets Religion}: 65-89,
from this is that physics – particularly at the quantum level – is not as predictable, as rigidly Newtonian or mechanistic as once thought. Theologically, this insight suggests a God who is not some divine clockmaker, a deistic God who set the whole universe in motion, and then withdrew to allow it to function according to some predetermined and unchanging principles of operation. Rather, God’s involvement is hidden and at times (but not always) unpredictable – his activity is discernible through faith and not experiment. Both science and theology offer us here a God who acts not only according to predictable natural laws – such as the rhythms of the seasons that reflect his faithful character – but also in an open, indeterminate way.

Polkinghorne’s fifth assertion is that both the physical world and theology are characterised by surprise. The emergence of quantum theory offers a logic that is at odds with the either/or logic that characterised earlier (Newtonian) physics. Scientists are now open to exploring the universe in a more imaginative and less linear way than previously available or thought possible. We might want to say the same about theology. Is theology a purely systematic enterprise, based on propositional statements about what is and what is not? Are we not faced with paradox in our Christian experience? How do love and suffering cohere in God? How can we explain the mystery of the incarnation – Jesus as both fully God and fully man? In both science and theology, our finite minds are confronted with infinite mystery. So we should not be surprised if both disciplines give rise to new, previously unimagined expressions of reality that may express paradox rather than conformity.

Polkinghorne then suggests that the insights of both science, in its investigation of the pattern and structure of the physical world, and theology are exciting. ‘Serendipity’ is a word which scientists sometimes use to describe the rewards of scientific research. After all the hard work of investigation and experimentation, of theories dashed and ideas discarded, there comes that moment when it is all worth while – like Crick and Watson’s discovery of DNA. Theoretical physicists are excited today about the possibility of drawing together the theories of general relativity and quantum mechanics into a Grand Unified Theory (GUT). Theologians are similarly imbued with a sense of expectation and wonder as they contemplate the grandeur of God. This happens not only as Christians meditate on the glorious truths of the gospel, the God who has come to us, and the eschatological hope of resurrection life. There is excitement too as believers open themselves to the divine mystery that somehow integrates all the many diverse aspects of human experience.

The religious believer can perceive the divine unity that underlies and unites this polyvalent diversity: science is exploring the rational order of creation; our aesthetic pleasures are a sharing in God’s joy in that creation; our moral intuitions are intimations of God’s will; our religious experience is the true meeting with him.

Yet – and this is Polkinghorne’s seventh assertion – both science and theology are problematic. The problem with the latest developments in science is that they are decidedly non-rational! Traditionally science has dealt with the ‘how?’ questions relating to reality, with the ‘why?’ questions left to theology. But now scientists acknowledge that they cannot explain how quantum theory works – except to agree that it does work. Theology has its intractable questions too. There are some obvious ones – like the problem of God and suffering. The response that human beings are given free will, and that creation has a freedom given to it by its creator, go some way to answering the problem … but not fully. Polkinghorne also addresses the problem of the diversity of religious belief: one of the greatest challenges facing Christians today is how to respond to the many different belief systems around. The presence of difficulties reminds us that neither science nor theology has all the answers – both are imperfect, evolving enterprises seeking in their unique ways to discover what each is capable of with regard to ultimate reality.

The consequences of all that Polkinghorne has been asserting are then summed up in his final point: science and theology have things to say to each other. It is precisely because both science and theology are incomplete that they can each learn from the other. Science reminds Christians that God’s creation is characterised by an evolving history: God is a patient God, whose actions in the universe are subtle and deep. And in ways that we cannot easily fathom, this world is shaped by both predictable natural processes and unpredictable events.}

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49 The idea of mystery is given explicit treatment by Haught in his examination of the relationship between religion and the environment, in which he espouses the twin themes of sacramentalism and silence: “Without being identified with nature, the divine mystery is nevertheless deeply interior to it – at least according to the sacramental vision.” See Haught, Science and Religion: 198-201.

50 Polkinghorne, Serious Talk: 56.
laws and unpredictable randomness, both of which are expressions of God’s love. Theology reminds science that science does not – and ultimately cannot – have all the answers to life’s mysteries. The great questions of meaning and purpose are ultimately theological, not scientific, questions.

**The Science-Religion Relationship: Conflict**

If, as Polkinghorne suggests, science and theology have things to say to each other, how might we represent the nature of that conversation? In recent years, a number of writers in the science-religion field have offered a range of alternative schematic outlines, or typologies, for consideration. Perhaps the most famous is that developed by Ian Barbour, whose scheme allows for four categories of relationship, which he first presented in abstract form in the 1990 Gifford Lectures, and first written up in his book, *Religion in an Age of Science.* Barbour’s typology is summarised in the four words ‘Conflict’, ‘Independence’, ‘Dialogue’ and ‘Integration’. They represent the variety of ways in which people have related science and religion. They range from the openly hostile – signified by the ‘warfare’ metaphor – to the desire for some form of synthesis between the two. John Haught proposes a slightly different typology, which is more easily remembered because each category begins with the letter ‘c’ – ‘Conflict’, ‘Contrast’, ‘Contact’ and ‘Confirmation’.

The Lutheran theologian Ted Peters, of the Centre for Theology and the Natural Sciences in Berkeley, California, has offered a rather more extensive eight-fold classification scheme, and his categories range (in popular language) from what he calls ‘pitched battle to an uneasy truce’. He also introduces the category of ‘Ethical Overlap’, which not only is significant in contemporary concerns regarding the ethics of applied technology but also reflects Peters’ specific interest in genetic technology. A very simple demarcation is made by Alister McGrath, who distinguishes between what he calls ‘confrontational models’ and ‘non-confrontational models’, though he does differentiate in the latter category between science and religion that are convergent and science and religion that are distinct.

The fundamental question is that of ‘enmity or alliance?’ Notwithstanding the problem of the plurality of sciences and the plurality of religious – and Christian – beliefs, the historical relationship has been characterised by both mutual hostility and mutual friendship … or, if not warm friendship, at least, a willingness to talk together! Both Barbour and Haught offer the term ‘conflict’ to describe the position of irreconcilable difference, even to the point of ‘warfare’, in the science-religion relationship. However, it wasn’t until well towards the end of the nineteenth century that open warfare was declared. Until then, science and religion enjoyed a reasonably good, if unstable, relationship, punctuated by tensions that existed as the result of the dispute between Galileo and the Catholic Church at the beginning of the seventeenth century, the rise of natural theology in the eighteenth century, and the Darwinian controversy in the middle of the nineteenth century.

For example, Cardinal Bellarmine, who was the Vatican’s key protagonist in dealing with Galileo and his support of Copernicus’ heliocentric model of the universe, had a far more open attitude to Copernican theories than is often supposed. He wrote on one occasion in a letter:

> I say that if there were a true demonstration that the sun is at the centre of the world and the earth in the third heaven, and that the sun does not circle the earth but the earth circles the sun, then one would have to proceed with great caution in explaining the Scriptures that appear contrary, and say rather that we do not understand them than that what is demonstrated is false.

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52 See, for example, Peters, T. (ed) *Genetics*; Peters, T. *Playing God?*

53 In a recent interview in the CTNS publication *Research News and Opportunities* (January 2001: 21,25) McGrath eschews the use of the term ‘convergence’ in favour of ‘resonance’.

Early on there were those within religious circles who were very much aware that the issues raised by the science-religion debate critically related to biblical interpretation, and it did no one any good – least of all within the Christian community – to insist upon one single, dogmatic interpretation of the biblical record. Furthermore, Galileo himself sought to relate his growing scientific understanding to his Christian faith. So, the Galileo affair is not a good representative of the ‘pitched battle’ scenario suggested by some.

A similar statement applies to the rise of Newtonian mechanics in the late seventeenth and eighteenth centuries. On the basis of his observations regarding mass, space and time, Isaac Newton was able to demonstrate that the world functioned according to certain mathematical principles. These laws of motion and gravity gave rise to the mechanistic worldview, lending weight to Christian beliefs about a provident designer, and accelerating the subsequent rise of natural theology – from data and empirical observations ‘down below’ we can intuit the nature and character of the divine author, or Creator, ‘up above’. However, secular interpretations encouraged the view that perhaps the world was in fact a self-sustaining deterministic mechanism, in need neither of a divine author nor of a divine sustainer.55 Newtonian ideas were originally seen as consistent with Christian notions of divine creation – they helped us to understand how God was at work in his world – Newton himself regarded God as the mediator of gravitational forces. But later in the eighteenth century, other forces began to erode theistic interpretations of Newtonian mechanics: the industrial revolution and the major social and economic changes of the time were strong secularising influences, along with increasing scientific endeavours.

In 1859 Charles Darwin published The Origin of Species, an evolutionary proposal that was not without its Christian apologists: there were those who supported what he had to say, and those who vigorously attacked him. Brooke notes that at the famous Huxley-Wilberforce encounter in Oxford in 1860, Frederick Temple, later to become Archbishop of Canterbury, “made room for Darwin’s science and was even said by one observer to have espoused Darwin’s ideas fully.”56 In a letter to Darwin, Charles Kingsley remarked that the theory of natural selection provided “just as noble a conception of deity, to believe that he created primal forms capable of self-development … as to believe that he required a fresh act of intervention to supply the lacunas which He Himself had made.”57 However, the assault on the ecclesiastical estabishment of the day by Draper and White fuelled the flames of conflict; the result was that the ‘warfare’ metaphor had particular relevance towards the end of the nineteenth century. Those who attacked Darwinism argued on the basis that belief in Darwinian evolution and belief in a Creator God were incompatible and therefore irreconcilable. So the debate was simplified down to creation or evolution. Huxley was perhaps more subtle than the aggressive, polemical stance of people like Draper and White. He saw in Darwinianism a powerful antidote to what he saw as the poison of Roman Catholicism. Rather than attacking the church, Huxley developed a strategy of imitation – he spoke of the “new Reformation” heralded by science. He preached “lay sermons” on scientific subjects, spoke of his colleagues as “the church scientific” and of himself as its “bishop” … at some lectures a hymn to creation, or ‘Mother Nature’, was sung by the attendant audience.

In the twentieth century, the conflict thesis is clearly discernible in the psychoanalytic theories of Sigmund Freud, especially in his notion of the irrationality of religious beliefs. Freudian theories about

55 “The problem for Christian apologists was this: In seeking to capitalize on the most accessible proof of God’s existence, and one having the authority of the sciences behind it, they came close to saying that what they meant by God was the craftsman, the mechanic, the architect, the supreme contriver behind nature’s contrivances. From this to atheism could be one short step. It only required an alternative metaphysics in which the appearance of design could be dismissed as illusory … If the only proof came from design, one was left with nothing on its collapse. The point is not that science undermined the design argument – certainly not in the eighteenth century. Quite the contrary. It was rather that religious apologists were asking too much of it.” (Brooke, Science and Religion: 195, author’s italics).

56 Ibid: 41. Brooke notes, along with others, that the debate between Huxley and Wilberforce was not as one-sided as legend has it. Indeed, Wilberforce was not as obscurantist as Huxley sought to convey: Darwin acknowledged some weaknesses in his argument pointed out by the bishop in a review in the Quarterly Review of The Origin of Species: “it picks out with skill all the most conjectural parts, and brings forward well all the difficulties.”

57 Quoted in Alexander, Rebuilding the Matrix: 199, original author’s italics. Here Kingsley, with others like the nineteenth-century Oxford Anglo-Catholic Aubrey Moore, was concerned to resist suggestions of a ‘God-of-the-gaps’ who was introduced only at those points where science was unable to offer an explanation for the operation of the natural world; so Alexander quotes Moore: “There are not, and cannot be, any Divine interpositions in nature, for God cannot interfere with Himself. His creative activity is present everywhere. There is no division of labour between God and nature, or God and law … For the Christian theologian the facts of nature are the acts of God” (Ibid: 199, original author’s italics).
human nature contained a deterministic fatalism, suggesting that human beings were victims of unresolved inner conflicts, so challenging the possibility of a free and open relationship with God. During Freud’s lifetime, a philosophical movement called ‘logical positivism’ was developed by a group of philosophers called the Vienna Circle. They believed that science gave ‘certain’ or ‘positive’ knowledge through the senses, a theory they believed followed as a matter of logic from the positivism of science. Taking an epistemological stance, logical positivism declared that only science had meaningful answers regarding knowledge, thus dismissing the metaphysical contributions of religion. Since science is ‘provable’ and religion is not, then religion can be discarded.

However, what logical positivism failed to appreciate was that science focused on questions of mechanism, whereas religion tended to focus less on mechanism than meaning. Recent thinking has posited some convergence between science and religion with regard to meaning.68 Haught, for example, argues that developments in physics and astrophysics “challenge the dualistic assumption that mind is fundamentally alien to the cosmos,”69 and bring us face to face with the reality of mystery. A further criticism of logical positivism is that science demands that assumptions be made – such as the uniformity of nature – which cannot be proved by our senses.60 Philosophically, logical positivism is unsustainable, for science itself is an evolving discipline – or, rather, the sciences are evolving disciplines. Science cannot give the final answer because science itself is changing, as twentieth-century developments in physics clearly show: “Far from demystifying the world, as the reductionist agenda proposed to do, science is now opening up the horizon of an inexhaustibly indeterminate universe.”61

The Science-Religion Relationship: Independence

Questions of meaning point us away from the confrontational approach to non-confrontational models. Whereas McGrath distinguished between convergent and distinct in his discussion, the term employed by Barbour is ‘independent’, whilst Haught prefers to think of ‘contrast’: in both, science and religion are regarded as two distinct ways of approaching reality. Perhaps the most famous expression of this independence of two valid approaches is what has come to be known as the ‘Baconian compromise’, after Francis Bacon (1561-1626). One of Bacon’s statements is called the “two-books” statement – “Let no man upon a weak conceit of sobriety or an ill-applied moderation think or maintain that a man can search too far, or be too well studied in the book of God’s word, or in the book of God’s works.”62 In effect, Bacon sharply separated the two,65 and subsequent advocates of this approach have suggested that science and religion, though equally valid, are basically tackling different questions.

One of the greatest advocates of separation between the two is Karl Barth, whose emphasis on revelation allows no place for what is known as ‘natural theology’, which argues that it is possible to know something about God through empirically-derived knowledge and the data of the sciences. At the heart of natural theology lies the premise that the world is God’s world, and it must therefore tell us something about its Creator. The claims and counter-claims of natural theology will be examined later in this chapter, but the point to appreciate here is that conflict, or ‘warfare’, between science and

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68 For example, the ‘naïve realist’ view of science, which claims that scientific discoveries correspond to truth – the logical positivist position – was attacked by the philosopher Karl Popper, whose proposal of a ‘reverse methodology’ in scientific rationality was influential in twentieth-century philosophy of science. He argued that falsification rather than verification was the appropriate criterion for distinguishing science and non-science: see Popper, Karl, The Logic of Scientific Discovery, London: Hutchinson, 1959. For a fine discussion of logical positivism and Popperian falsificationism in the context of truth and reason in science and theology, see Southgate et al., God, Humanity and the Cosmos: 49-92; see also Alexander, Rebuilding the Matrix: 230-239.
69 Haught, Science and Religion: 193; Haught maintains that “[w]e are now becoming convinced that mind is much more deeply embedded in the universe than we had for centuries suspected” – so quantum physics and the principle of indeterminacy imply that “the observed world cannot be sharply segregated from the human observer or instruments of observation”. This link between mind and matter is, for Haught, integral to his understanding of meaning attributable to the physical universe, a theme which he expounds within an ecological – and eschatological – frame of reference (Ibid: 183-201)
60 Freud – himself a Viennese – captured the spirit of logical positivism by insisting that his interpretation of human nature was no illusion!
63 However, as Brooke points out, ‘Bacon remained convinced that scientific conclusions had still to be limited by religion … he gave science a religious sanction, in that it promised a restoration of a dominion over nature that had been God’s intention for humanity’ in Brooke, Science and Religion: 57.
religion is avoided by keeping them as far apart as possible. Each maintains its own integrity, and cannot be threatened by the advances of the other. In the seventeenth century, the French philosopher René Descartes (1596-1650) reinforced the ‘independence’ between science and religion, regarding revelation as a separate form of knowledge, and laying important foundations, along with Bacon, for the Newtonian mechanistic worldview.

One mid-twentieth-century writer who has clearly articulated the ‘independence’ thesis is the North American neo-orthodox author Langdon Gilkey. Ian Barbour summarises his argument in terms of four clear distinctions:

(1) Science seeks to explain objective, public, repeatable data. Religion asks about the existence of order and beauty in the world and the experiences of our inner life (such as guilt, anxiety, and meaninglessness, on the one hand, and forgiveness, trust, and wholeness, on the other). (2) Science asks objective ‘how’ questions. Religion asks personal ‘why’ questions about meaning and purpose and about our ultimate origin and destiny. (3) The basis of authority in science is logical coherence and experimental adequacy. The final authority in religion is God and revelation, understood through persons to whom enlightenment and insight were given, and validated in our own experience. (4) Science makes quantitative predictions that can be tested experimentally. Religion must use symbolic and analogical language because God is transcendent.

Haught’s way of expressing this distinction between science and religion – his ‘contrast’ category – is to suggest that advocates of this approach want to “avoid conflating science and belief into an undifferentiated smudge.” For example, in recent decades there have been significant attempts made by ‘creation scientists’ to demonstrate that science is fully in support of a literal interpretation of the Genesis account of the creation of the world, especially through what is known as ‘flood geology’. Advocates of the independence thesis want to avoid such examples of what they see as unfounded and unsubstantiated rejection of scientific accounts of biological and cosmological evolution. They argue that ‘creation science’ is turning belief into a pseudo-scientific form, offering an alternative scientific theory. What supporters of the independence approach to the science-religion debate would say is that religion must not use science as its ally in such a fraudulent, and essentially unscientific, way.

In his recent book, Rock of Ages, the evolutionist Stephen Jay Gould presents science and religion as occupying different domains. His basic principle is known as NOMA, or ‘non-overlapping magisteria’, and he echoes the perspective offered by Langdon Gilkey when he argues that: “The magisterium of science covers the empirical realm: what is the universe made of (fact) and why does it work this way (theory). The magisterium of religion extends over questions of ultimate meaning and moral value.” Gould is equally trenchant in his criticism of scientists in any attempt they might make to derive theological insight from their scientific endeavours. His rejection of purpose in creation strikes at the very heart of religious convictions. For Gould, biological (or cosmological) evolution is totally incompatible with purposeful creation.

Such a view can be found in the work of the Nobel Prize-winning theoretical physicist Steven

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64 Descartes’ distinction between reason and revelation corresponds to the sharp dualism between body and soul in his understanding of human nature, both of which reflect his rationalist epistemology. Whereas Bacon’s methodology was essentially inductive, Descartes’ scientific approach was deductive, starting from his well-known statement, cogito ergo sum, and then moving downward from that primary certainty to the physical world. For a study of Descartes’ philosophy and scientific method, and an acknowledgement of the inconsistencies in his methodology, see Smith, Norman Kemp, New Studies in the Philosophy of Descartes. London: Lowe and Brydone, 1966; and Westfall, Richard S., Science and Religion in Seventeenth Century England, New Haven CT: Yale University Press, 1958.


70 Human beings, argues Gould, are “a wildly improbable evolutionary event, and not the nub of universal purpose” (Ibid: 206), a contrast to the closing words in Davies’ The Mind of God (p.232): “I cannot believe that our existence in this universe is a mere quirk of fate, an accident of history, an incidental blip in the great cosmic drama … We are truly meant to be here.”
Weinberg, who famously wrote in his book *The First Three Minutes* that “the more the universe seems comprehensible, the more it also seems pointless.” 71 Later in his book he wrote that it is very hard to realise that the world is just a tiny part of an overwhelmingly hostile universe. Such purposelessness and hostility suggest a bleak, even chilling, evaluation of creation, contradicting the Christian claim that the universe is inherently intentional and teleological. However, Weinberg does redeem himself by insisting that human beings can give the universe a purpose through the way we live our lives: although we may not be the stars in any great cosmic drama, we can nonetheless create for ourselves what he calls ‘a little island of warmth and love and science and art’ in an unloving and impersonal universe.

**The Science-Religion Relationship: Dialogue**

We now need to consider the idea that science and religion – and specifically Christianity – need be neither in conflict with nor independent of each other. For Haught, words like contact and confirmation are employed, whilst Barbour speaks of dialogue and integration. McGrath collapses all these typological categories under the heading convergence, but here we will use the word ‘dialogue’. There are many theologians and scientists who have spoken wisely about the need for dialogue, and to this group we might add churchmen too: Pope John Paul II once declared: “Science can purify religion from error and superstition; religion can purify science from idolatry and false absolutes. Each can draw the other into a wider world, a world in which both can flourish.” 72

The dialogue approach suggests that we are wise to be cautious about the two extremes of biblical literalism and fundamentalist scientism identified in the pages above. In a critique of fundamentalist scientism, which claims that all meaningful reality can be reduced to materialistic statements, the Christian astrophysicist, Dr Bernard Haisch, castigates those who claim that “investigation of the physical world rules out anything spiritual”, criticising such a position as both irrational and dogmatic. He goes on to say, “Rejection of evidence that cannot yet be measured with instruments in a laboratory is contrary to the scientific spirit of enquiry. It is time to move beyond dogmatic fundamentalism in both religion and science.” 73 The dialogue approach maintains that the sciences have much to learn from religious insights about the real world in which we live. Conversely, Christians need to listen to the voice (or, rather, the many voices) of the sciences, as they offer insights about how God’s world works.

When Haught uses the term ‘contact’ between science and religion, he means that the two inevitably interact – though they are distinct, they have implications for each other. So ‘contact’ “insists on preserving differences, but it also cherishes relationship.” 74 In his quest for ultimate answers, Paul Davies, the well-known physicist, comes to the conclusion that “it is hard not to be drawn, in one way or another, to the infinite.” 75 He continues: “I have never had a mystical experience myself, but I keep an open mind about the value of such experiences. Maybe they provide the only route beyond the limits to which science and philosophy can take us, the only possible path to the Ultimate.” 76 Similarly, whether they are willing to acknowledge it or not, theologians bring to their thoughts about God certain pre-understandings about the nature of the physical world.

Dialogue means that there must be some thoughtful and intelligent contact between the sciences and Christian faith. Haught’s ‘contact’ approach proposes that “scientific knowledge can broaden the horizon of religious faith and the perspectives of religious faith can deepen our understanding of the universe.” 77 Both theologians and scientists are therefore in the business of ‘doing theology’ or ‘doing

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76 Ibid: 232.
science’, an imperative that highlights the philosophical notion of critical realism. Critical realism acknowledges that there is a real world ‘out there’, the operation of which we can begin to understand through our ‘models’ and theories. The knowledge human beings have of the real world is both provisional and fallible: the real world, whether the universe or God, is too vast for the human mind to encompass. It follows, then, that our knowledge – whether scientific or theological – can never be independent of the ‘knower’.

Critical realism has been helpfully defined as

a way of describing the process of ‘knowing’ that acknowledges the reality of the thing known, as something other than the knower (hence ‘realism’), whilst also fully acknowledging that the only access we have to this reality lies along the spiralling path of appropriate dialogue or conversation between the knower and the thing known (hence ‘critical’). This path leads to critical reflection on the products of our enquiry into ‘reality’, so that our assertions about ‘reality’ acknowledge their own provisionality. Knowledge, in other words, although in principle concerning realities independent of the knower, is never itself independent of the knower.

The provisionality implicit in the critical-realist position means that we cannot close the door on new, future understandings: the universe in which we live and the God who is worshipped are both far greater than ourselves – so both science and religion (as human endeavours to understand reality) need to be open to correction.

Peacocke is one of many contemporary writers who espouse a critical-realist perspective towards both science and theology.

Critical realism recognizes that it is still only the aim of science to depict reality and that this allows gradations in acceptance of the ‘truth’ of scientific discoveries … It must never be forgotten that the realism is always qualified as ‘critical’ since the language of science is … fundamentally metaphorical and revisable …

With regard to theology, Peacocke distinguishes between referring to and describing God, a distinction that is crucial to a critical-realist stance in theology. Alongside the approach to theology known as via negativa, which recognizes that all we have to say about God is ultimately fallible, and therefore a potential “slippery slope to atheism”, we need to more positively affirm the reality of God in metaphors and models (via positiva). “The metaphors of theological models that explicate religious experience can refer to and can depict reality without at the same time being naively and unreasonably descriptive, and they share this character with scientific models of the natural world.”

In the second volume of A Scientific Theology, McGrath presents a thorough defence of theological realism, arguing that theology, like any other responsible discipline, “is accountable for its rendering of reality, and must be called upon to reform and revise its ideas if these can be shown to be out of line with what they purport to represent.” The philosophical concept of ‘realism’ – of which critical realism is one option – represents a specific aspect of epistemology and ontology which maintains that there exists a real world which is external to the human mind, a reality which can be accessed through a range of disciplines, such as the social sciences, the natural sciences and theology. McGrath notes approvingly that realism is now ‘back in fashion’, pointing out that it is clearly presupposed and applied by the classic theological tradition in its affirmation that “responsible theological statements are laden, not theory-free. Theoretical assumptions enter the selection, reporting and interpretation of what are taken to be data. Moreover, theories do not arise from logical analysis of data but from acts of creative imagination in which analogies and models often play a role … In religious language, too, metaphors and models are prominent … Clearly, religious beliefs are not amenable to strict empirical testing, but they can be approached with the same spirit of inquiry found in science.” (Barbour, When Science Meets Religion: 25).

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79 Peacocke, Theology for a Scientific Age: 12, 13, author’s italics.
80 Ibid: 15.
81 Ibid: 15. For a fuller discussion of metaphors and models in theology, see Barbour, Ian G., Myths, Models and Paradigms, New York: Harper & Row, 1974; Soksice, Janet, Metaphor and Religious Language, Oxford: Clarendon Press, 1985; and McGugue, Sallie, Metaphorical Theology: Models of God in Religious Language, Philadelphia: Fortress Press, 1982. Barbour comments on the methodological and conceptual parallels between science and theology in response to those who contrast the ‘objectivity’ of science with the ‘subjectivity’ of religion: “Scientific data are theory-laden, not theory-free. Theoretical assumptions enter the selection, reporting and interpretation of what are taken to be data. Moreover, theories do not arise from logical analysis of data but from acts of creative imagination in which analogies and models often play a role … In religious language, too, metaphors and models are prominent … Clearly, religious beliefs are not amenable to strict empirical testing, but they can be approached with the same spirit of inquiry found in science.” (Barbour, When Science Meets Religion: 25).
83 Ibid: 199, author’s italics.
about God can be taken to refer to God.”

McGrath observes that realism actually represents a family of philosophical positions, noting three general approaches: the world is mind-independent; (only) non-mental entities exist; and mental and non-mental entities exist. All these views challenge the idealist, or anti-realist, position that argues that what human beings perceive derives from mental construction and does not lie outside the human mind. Realists, however, agree that “the human mind generates ideas – yet it generates those theories in response to what it encounters outside itself.” This is the case not only within the natural sciences, which lend themselves particularly to a realist epistemology, but also within theology. For example, the fundamental Christian doctrine of creation presents us with an ontological imperative since “the nature of reality is such that the question of how it is to be known is imposed upon us.”

However, as McGrath points out, citing the work of the philosopher Roy Bhaskar, reality may be viewed as multi-layered, an ontological insight which has important epistemological implications, as each layer – or stratum – of reality demands a methodology appropriate to its ontology. Bhaskar’s argument challenges “both reductionist approaches which collapse reality into a single observable stratum, and pluralist theories which affirm the existence of different strata, but decline to see them as dependent upon each other.” It follows from this argument that reality cannot be determined by whether or not it is known, a particularly significant observation in the light of the reductionist claims of those scientists with an anti-religious agenda. The significance of the concept of a stratified understanding of reality for the developing dialogue between science and theology is that it allows us to argue that the natural sciences investigate the stratified structures of contingent existence at every level open to human inquiry, while a theological science addresses itself to God their creator who is revealed through them … It is not the position of theology within the stratification of reality which is of critical importance, but the position of God.

McGrath’s affirmation of natural theology here should not be interpreted as “constituting ‘proof’ of God’s existence or the intellectual credibility of the Christian faith.” Throughout his many writings as an evangelical theologian, as in this volume, he insists upon the validity of revelation as the primary source of knowledge about God within the Christian faith; so natural theology derives its intellectual foundations from within the Christian tradition. McGrath helpfully points out that the Enlightenment critique of revelation’s ‘scandal of particularity’ – with the moral problem of its universal inaccessibility – is paralleled by “the fictitious notion of universal reason”, as disclosed by the insights of the sociology of knowledge.

As an alternative to the evident limitations of a universal rationality, the writings of the philosopher Alisdair McIntyre are put forward in support of the importance of the community and its traditions in rational discourse, legitimising the validity of the Christian tradition of God as creator of humanity and the world. McGrath concludes that because the Christian concept of natural theology maintains that something of God may be known outside the Christian tradition, it “offers us an interpretative grid by which other traditions may be addressed on the common issues of existence, enabling the coherence

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84 Ibid: 134, author’s italics.
85 Ibid: 121-193; on critical realism, and its preference as an alternative to naïve realism (which eschews reflection on the part of the human knower so that reality impacts directly upon the human mind) and postmodern anti-realism (in which the human mind freely constructs its ideas without any reference to an alleged external world), see ibid: 195-244.
87 McGrath, A Scientific Theology, Vol II- Reality: 227, 228-229; McGrath develops the notion of stratified reality in theology with reference to Karl Barth’s theology of the Word of God and Thomas Torrance’s theology of the Trinity, arguing that both in fact deal with stratification within theory – i.e. at the level of explanation – rather than within reality: so Barth distinguishes between the Word of God as revelation, Scripture and preaching, and Torrance distinguishes between Christian trinitarian experience, the economic Trinity and the ontological Trinity (ibid: 232-238). McGrath agrees with Bhaskar’s critical-realist proposal that we live in a world characterised by a multi-layered reality that requires investigation and explanation within a multi-disciplinary framework – theology, amongst other disciplines, therefore faces the task of addressing the stratified world of nature within the construal of critical realism.
88 See, especially, his chapter “Natural Theology and the Trans-Traditional Rationality” (ibid: 55-120).
89 Ibid: 74.
and attractiveness of the Christian vision to be affirmed."\textsuperscript{91} In a plea to take seriously the processes of human cognition and rationality, Peacocke puts forward a case for a critical realist epistemology known as ‘inference to the best explanation’ (abbreviated to IBE), according to which we infer what would appear to be the best possible explanation from all available data: “In IBE, the process of argument is to present those features of a case which severally cooperate in favour of a conclusion.”\textsuperscript{92}

For Peacocke, theology is a particularly apt discipline for the application of IBE, on the specific grounds that “strict falsifiability is not emphasised nor any absolute requirement for novel predictions” and in theology “over falsifying of theological affirmations is notoriously unavailable.”\textsuperscript{93} Peacocke proposes five criteria for the 'best' explanation amongst a range of possible candidates, namely comprehensiveness, fruitfulness, general cogency and plausibility, internal coherence and consistency, and simplicity or elegance. These criteria, which need to be held in tension with each other within a web of beliefs and knowledge,\textsuperscript{94} suggest for Peacocke a ‘theology at the crossroads’:

it is now essential that the theological pier of the bridge to science be subject to the same demands for epistemological warrant and intellectual integrity as other disciplines, especially science – and to relinquish any unestablished confidence that the content of traditional theological affirmations is divinely warranted.\textsuperscript{95}

In the development of his argument, Peacocke is anxious to avoid any over-simplistic parallels between traditional natural theology – to be addressed shortly – and his own proposal, insisting that the IBE process is rather more subtly nuanced than the weak links characteristic of those who seek to deduce the nature and attributes of God from empirically derived data about the physical world. However, in his methodology – which gives central place to IBE within the science-theology dialogue – Peacocke warns against too sharp a discrimination between various modes of revelation in God’s self-communication with humanity, preferring to speak of ‘gradations’ between different categories of revelation.\textsuperscript{96} The result is an ‘open theology’ characterised by a hesitancy about the primacy of the doctrine of special revelation in Christian theology (without, however, dismissing its importance), an openness to “the Word/Logos as it is manifested in other religions as not at all derogating from the Christian revelation”\textsuperscript{97}, and a web of beliefs\textsuperscript{98} which favours describing God in the language of Ultimate Reality rather than the orthodox trinitarianism of Christian revelation.\textsuperscript{99} McGrath’s concern

\begin{itemize}
  \item [91] Ibid: 75.
  \item [93] Ibid: 27; Peacocke’s advocacy of IBE within a critical realist framework is expressed forcefully in a number of places in his book, for example: “I urge that IBE is the procedure that best leads to public truth about the relation of nature, humanity and God which is both communicable and convincing by its reasonableness through reflection on our most reliable and generally available knowledge of nature and humanity. To most in Western culture such knowledge is pre-eminently forthcoming from the sciences. Such an approach might even open a path towards God for the many wistful agnostics and the ‘cultured despisers’ of any form of theism.” (Ibid: 30).
  \item [95] Peacocke, Paths from Science Towards God: 30.
  \item [96] We noted earlier that the term ‘gradation’ is used by Peacocke in his critical-realistic approach to the sciences.
  \item [97] Ibid: 170.
  \item [98] The concept of a ‘web of beliefs’ should not be regarded as epistemologically inferior to revelation, but rather as a different way of ordering knowledge. In her response to a paper presented by Owen Gingerich at a conference in New Zealand, Nancy Murphy advocates such a holistic model as a replacement for the traditional linear geometric model of reasoning; so “the epistemological task is to seek coherence and consistency within the web without losing touch with experience” (see Gingerich, Owen, “Is There a Role for Natural Theology Today?” and Murphy, Nancy, “Response” in Rae, M., Regan, H. and Stenhouse, J. (eds), Science and Theology: Questions at the Interface, Edinburgh: T. & T. Clark, 1994: 29-48, 65-71). Murphy argues in her paper that coherence and consistency within a web may strengthen Christian claims to truth, although she confesses that “some of the proponents of an atheistic worldview have been much more effective rhetorically than Christians have been” in sustaining their position (Ibid: 68).
  \item [99] Peacocke is cautious with respect to differentiation in his trinitarian understanding of God: “I prefer to be non-assertive about the nature of any differentiation within the divine Being and Becoming, willing to accept that it is threefold but not to speculate about the relationship of the three to each other. The triple nature of Christian experience certainly points to a threefoldness in the modes of Being and Becoming of God, but I prefer to remain
\end{itemize}
about Peacocke’s Christian orthodoxy, cited earlier, would seem to be well grounded.

Nonetheless, what does emerge from Peacocke’s recent writing is the recognition that, whether we are scientists or theologians, we are necessarily pilgrims, and that demands an attitude of humility, and a willingness to learn from others. Karl Popper, perhaps the greatest twentieth-century philosopher of science, has argued that the scientific quest is not in fact a quest for absolute truth: rather, it is a quest for greater verisimilitude — a more accurate ‘model’ — in our understanding of reality. The same is true with regard to theology. No theologian can claim to have the last word about the God who is greater than finite minds. It is with this provisionality in mind that we might usefully approach the idea of dialogue in the relationship between science and religion. McGrath, as we noted, expresses this friendship between science and religion in terms of resonance: theologians and scientists must at least listen sympathetically to each other, with a willingness to adjust where it may seem appropriate, in order to avoid the charge of arrogance.

Barbour suggests that science and religion are similar, or converge (to use McGrath’s phrase), in a number of important respects. Philosophically and methodologically, dialogue “emphasizes similarities in presuppositions, methods and concepts.” We noted a number of significant methodological parallels between science and religion in our discussion of critical realism, with particular reference to metaphors and models. In addition, Barbour observes that science raises a number of questions that it is unable to answer — these are called limit-questions, or boundary questions. For example, at the cosmological level, theories about the origin of the universe raise questions related to temporal, spatial and conceptual boundaries: Why is there a universe at all? At the microbiological level, and in the light of recent neuroscientific research into the link between the mind and the brain, is it really conceivable that such human characteristics as love, compassion, altruism and honesty are nothing but chemicals? The boundaries of science are evident whenever scientific reductionism “shouts out too profanely and prematurely that it has finally plumbed the depths of all reality and brought the long human quest for coherence to its final stage.”

Alternative Theological Approaches to Dialogue

Barbour then discusses three theological ideas — natural theology, theology of nature and process theology — under the rubric of ‘integration’. Each of these theological dimensions of constructive relationship will be considered in turn. Natural theology first emerged in seventeenth-century England...
as a means of reinforcing the validity of Christian revelation, known in its original context at that time as ‘physico-theology’, and given rich expression in, amongst other texts, John Ray’s 1691 work The Wisdom of God Manifested in the Works of Creation.\textsuperscript{106} McGrath notes a number of interconnected developments during this period that fostered interest in “the revelatory capacities of the natural world”: the rise of biblical criticism, with a consequent openess to other means of knowing the divine; the rejection of ecclesiastical authority, leading to a desire for emancipation from the church; the quest for a primordial ‘religion of nature’ as an alternative to the pomposity and conservatism of organised religion; and the rise of the mechanical world-view, which encouraged a purely naturalistic understanding of the universe.\textsuperscript{107} The polemical social context within which natural theology developed at this time – in contrast to the earlier less abrasive ‘natural theologies’ of Aquinas and Calvin – corresponds to the polemical religious context which contributed to Barth’s furious critique of natural theology three centuries later.\textsuperscript{108}

In natural theology, dialogue between science and religion is predicated on the assumption that it is possible to know about God through what he has created, and specifically that the existence of God can be discerned from the evidence of design in nature. It is a well-known axiom of revelation-based Barthian neo-orthodoxy that all attempts to understand God through the natural senses or through human reason should be eliminated. Barth was dismayed by the impotence of liberal theology in the face of the horrors of World War I, and appalled by the capitulation of German theology to Nazi propaganda in the 1930s. He also wanted to dispense with any suggestion that natural theology could prove the existence of God: hence his resistance to the construction of a Christian theology from secular – that is, human – data: “One of Barth’s central concerns is to expose the myth of human autonomy, and identify its consequences for theology and ethics.”\textsuperscript{109} Contra Barth, Brunner argued that there was ‘a point of contact’ for divine revelation within human nature: since human beings are created imago Dei, then we are analogous to the being of God.\textsuperscript{110} In his Church Dogmatics Barth acknowledges “the existence of other events and powers, forms and truths alongside the one Word of God”,\textsuperscript{111} but this “possibility of a natural theology as such” can never represent an alternative, independent source of Church proclamation. It is legitimate only if it is predicated on the prior recognition that God has made himself known in Jesus Christ: in other words, natural theology is valid if, and only if, it is located within the structure of divine revelation.\textsuperscript{112}

One particular representation of natural theology is the ‘design argument’, otherwise known as the teleological argument, which states that the beauty, order and elegance discernible in creation imply a ‘cosmic architect’ behind it all.\textsuperscript{113} The ‘design argument’ can be traced to early Greek thought. For example, Cicero, in his book On the Nature of the Gods, refers to the order and beauty of the heavens, the design of the human body and earthly provision for people’s needs: all these things pointed towards design in the world. The Stoics in the Roman world believed the universe to be unified and intelligible, a single, well-ordered system. Further philosophical underpinnings can be found in Aristotle’s notion

\textsuperscript{106} For a study of Ray, see Raven, Charles E., John Ray, Naturalist: His Life and Works, Cambridge: Cambridge University Press, 1986. Brooke comments that in Ray’s work there is “a sense of exultation in the wonders of nature. So marvellous was the migrating instinct of birds that he could only ascribe it to the superior intelligence of their Creator.” (Brooke, Science and Religion: 24).

\textsuperscript{107} McGrath, A Scientific Theology, Vol I - Nature: 244-248.

\textsuperscript{108} Ibid: 268.

\textsuperscript{109} McGrath, A Scientific Theology, Vol I - Nature: 269; McGrath adds that “Barth’s attitude to natural theology rests partly on his concern that the assertion of the human autonomy to find God in whom or where it pleases inevitably leads to the enslavement of theology to prevailing cultural and ideological currents.” (Ibid: 271).

\textsuperscript{110} Brunner used the example of sin and repentance – human beings have an intrinsic understanding of these two concepts, and fuller understanding is provided through revelation. For a full account of the arguments on either side of the Barth-Brunner debate see Barth, Karl and Brunner, Emil, Natural Theology, London: SCM Press, 1947.

\textsuperscript{111} Barth, Karl, Church Dogmatics 2/1, Edinburgh: T. & T. Clark, 1957: 178.

\textsuperscript{112} This interpretation of natural theology within revealed theology in Barth’s thinking is explored most fully in Torrance, Thomas F., “The Problem of Natural Theology in the Thought of Karl Barth” in Religious Studies 6 (1970), 121-135.

\textsuperscript{113} The parallel with William Paley’s well-known argument from design in his 1802 publication Natural Theology is apparent – Paley, a nineteenth-century Anglican priest, suggested that the discovery of a watch with its meticulous design pointed to a transcendent Designer; likewise, the complexity of human beings argues in favour of a God with a mind and a personality. See Paley, William, Natural Theology, Boston: Gould, Kelly & Lincoln, 1850, and especially Brooke’s discussion of Paley in his chapter on “The Fortunes and Functions of Natural Theology” in Brooke, Science and Religion: 192-225.
of the ‘unmoved mover’, and theological origins can be traced to the thought of Augustine and Aquinas. The scientific discoveries of the sixteenth and seventeenth centuries actually bolstered the idea of intelligent design, implicit in the equal validity of Bacon’s ‘two books’, and scientists and theologians alike were united in championing the design argument as the anticipated ‘nail in the coffin’ of atheism. More recently, the ‘design argument’ spawned the concept of the anthropic principle, discussed earlier, which supports the idea of a transcendent and purposeful Creator, a providential God who had planned everything from the very beginning.

Earlier in this chapter, we noted Polkinghorne’s observation that the physical world testifies to marvellous and transparent rationality: there is beauty and elegance in the mathematical equations and patterns that describe the universe. Many scientists and theologians during the centuries leading up to the Enlightenment held to the rationality of the universe, interpreting this within a solid theistic framework: for them, God was the common ground of rationality. The great physicist, Albert Einstein, once confessed to what he described as a deep faith in the rationality of the world. He did not ascribe this rational orderliness to a God who acts in some way upon his creation; rather, he subscribed to a pantheistic sort of God who was identified with the creation itself. He also rejected the idea of an open universe – for Einstein, the universe operated as a deterministic mechanism: hence his frequently quoted remark that “God does not play dice.” Einstein’s opposition to the idea of chance as a player in the cosmic drama was shared by many others, including the eighteenth-century French mathematician Pierre Laplace, who claimed that if we knew the position of every particle in the universe we could calculate all future events.

Linked to the idea of order is the notion of beauty. Cicero once remarked that a person who cannot feel the power of God when gazing at the stars is probably incapable of any feeling at all! Throughout the ages, scientists and theologians alike have enthused about the beauties of earth and sky, seeing them as clear pointers to the beauty and majesty of the Creator God. The Bible too bears witness to the glory and majesty of God’s creation, as expressed in Psalm 8 and Psalm 19:1-6. Haught argues that the universe is influenced by an ‘aesthetic’ cosmological principle that causes it to expand and intensify its inherent beauty: the Christian God is therefore best understood as “One who wills the maximization of cosmic beauty.” Similarly, Polkinghorne refers to the world as a ‘carrier of beauty’: ‘Beauty is not just a sort of froth on the surface of things. It is something very deep about the world.’

The theologian Jeffrey Sobosan writes of “the commonness of the beauty always available, one that does not hide itself in secret nor show itself only to the elect.”

But the ‘design argument’ is not without its limitations, nor its detractors. Problems in relation to the ‘design argument’ arose in the nineteenth century as a result of the impact of Enlightenment thinking, and the subsequent arrival of Darwin’s The Origin of Species in 1859: both contributed to a growing disaffection with the idea of intelligent design. How, for example, was it possible to reconcile evolutionary theories about natural selection and survival of the fittest with any form of benevolent design? Furthermore, the idea of randomness in Darwinian natural selection begs the question: how can an intelligent cause – who may or may not be expressed in theistic language – be reconciled with the ‘accidental’ mutations of evolutionary processes? Similar questions apply to disorder in the cosmos, such as earthquakes and other natural catastrophes.

One inherent problem associated with the ‘design argument’ as a category of natural theology is that, by itself, it could just as easily posit a God of the deists, outside his creation, remote and uninvolved, a God who ‘wound up the clock’ and has since long departed. Throughout the eighteenth and nineteenth centuries, the orthodox idea of God as Creator supplanted the biblical view of a God who is immanent as well as transcendent. God was seen increasingly as a distant God as natural theology’s ‘design argument’ began to squeeze out the idea of a God who is immanent in his creation. Contemporary exposés of the weakness of the design argument are represented in Davies’ suggestion of a ‘space age astro-engineer’: “it is perfectly possible for much, if not all of what we encounter in the universe to be the product of intelligent manipulation of a purely natural kind: within the laws of

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114 Haught, Science and Religion: 140.
115 Polkinghorne, Serious Talk: 8.
116 Sobosan, Jeffrey G., Romancing the Universe, Grand Rapids: Eerdmans, 1999: 39. Sobosan rebukes four great theologians of the twentieth century – Barth, Brunner, Bultmann and Bonhoeffer – for their failure to acknowledge the way science can inform our understanding of God’s beautiful creation: commenting on Barth’s presentation of the doctrine of creation in his Church Dogmatics, he writes that “he relied on a dazzling display of exegesis that attended to Genesis but refused the insights of science, ignoring almost all the currently pertinent data of geology, evolutionary biology and astrophysics.” (ibid: 11). For a contrasting perspective on Barth – and the place of Mozart in theology! – see Sherry, Patrick, Spirit and Beauty: An Introduction to Theological Aesthetics, Oxford: Clarendon Press, 1992.
The debate is still very much alive today, fuelled by the antagonism between evolutionary scientists such as Richard Dawkins and the Intelligent Design Movement (IDM). The IDM began in the 1980s and is, in fact, theology-minimalist, presupposing neither a Creator nor miracles: it tracks intelligence without speculating on the nature of that intelligence. As a result, the movement embraces a wide range of philosophical, theological and scientific perspectives, united in their opposition to all forms of naturalism: intelligent design is therefore predicated on the observation that intelligent causes can do things which undirected natural causes cannot. But exactly do we mean by ‘intelligent design’? In order to address the difficulties raised by those who are hostile to the very notion of purposeful design, it may be helpful to think in terms of fixed, totally fore-ordained and detailed plans for the unfolding of the universe and human life, and more in terms of a universe which has been given freedom by God to develop within God-given built-in self-organising capacities.

Those scientists who insist that the universe is a meaningless and purposeless zigzag path of evolutionary development, without any intelligence or reason behind it, embrace a view which is called metaphysical reductionism: there is no need to posit an author behind nature, because ultimately all things are reducible to scientific explanation. For Richard Dawkins, Stephen Jay Gould, and other scientific reductionists, there is no ultimate teleology, or purposeful goal in creation, let alone a divine plan. Their position is avowedly atheistic, and their perspective has been well stated by the Harvard astrophysicist Owen Gingerich in his critique of Dawkins, who seems to feel that by defending the view that a mechanistic process could have brought about humankind, his case against design had been made. But we can look at the same data and come to opposite conclusions: He is no more able to prove the non-existence of a Creator than I, by arguments from design, can prove the existence of a super-intelligent Designer and Creator.

In an attempt to facilitate genuine dialogue with regard to God’s relationship to the world, a number of scientists and theologians have recently begun to take seriously the idea of God as the intelligent designer of an amazingly complex self-organising system. Barbour therefore directs us to what he calls a theology of nature as another expression of the positive relationship between science and religion. Here, doctrines of creation and human nature are influenced by scientific findings. For Barbour, the starting point for a theology of nature is not science but religion, expressing a ‘top-down’ approach as distinct from the ‘bottom-up’ approach of natural theology. The theme of ‘downward causation’ is evident in the work of Peacocke, whose starting point is a God who is an improvising choreographer or composer, ever at work continuously creating in and through ‘the stuff of the world’ which has always had inherent within it the potentialities for higher forms of life. So Peacocke defends the idea of God as ‘top-down cause’, beyond whom there is no further causation, but below whom lower-level laws and interactions take place: ‘these new perceptions of the way in which causality actually operates in our hierarchically complex world provides a new resource for thinking about how God could interact with that world.’

The model advocated here is essentially panentheistic. Peacocke quotes approvingly Augustine’s

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118 Dawkins’ book *The Blind Watchmaker* has the explicit subtitle: *Why the Evidence of Evolution Reveals a Universe without a Design*.
120 Gingerich, “Is There a Role for Natural Theology Today?”: 44, author’s italics.
122 Peacocke, *Theology for a Scientific Age*: 158.
123 Panentheism has been defined as “the belief that the Being of God includes and penetrates the whole universe, so that every part of it exists in Him but (as against pantheism) that His Being is more than, and is not exhausted...
vivid description of the whole creation as a ‘huge sponge’ penetrated by a boundless sea: “that sponge must needs, in all its parts, be filled with that unmeasurable sea: so conceived I Thy creation, itself finite, full of Thee, the Infinite; and I said, Behold God, and behold what God hath created; and God is good, yea, most mightily and incomparably better than all these …”\(^\text{124}\) A panentheistic interpretation of God’s interactions with his creation differs from pantheism in holding together God’s transcendence with his immanence \textit{without confusing the two}. In other words, God’s otherness is not compromised since he is continually interacting with the whole world system in a top down causative influence, culminating in events observed in the regularities and laws operative within the universe and explained by the natural sciences. This enables us to hold scientific theories about the universe in creative tension with fundamental Christian beliefs about the transcendent sovereignty of God.

But we need to go further, and introduce into the picture the notion of chance, a “slippery word” because, as Alexander demonstrates, it can be used in three different ways.\(^\text{125}\) The first meaning relates to events that are unpre-dictable because we cannot, for \textit{practical reasons}, possess the necessary information needed to predict the outcome – such as in the tossing of a coin.\(^\text{126}\) Secondly, chance may refer to “events that are physically indeterminate, as in the conventional interpretation of quantum mechanics”\(^\text{127}\) – these quantum events could be described in terms of ‘pure chance’ because they are indeterminate in \textit{principle}, and not just in practice. The third type of chance Alexander calls ‘metaphysical chance’, a descriptive metaphor – unrelated to the first two technical categories of chance – which corresponds to the principle or power that rules the universe.\(^\text{128}\) Dismissing this third

\begin{quote}
by, the universe” in Cross, F. L. and Livingstone, E. A., (eds) \textit{Oxford Dictionary of the Christian Church}, 2\textsuperscript{nd} edition, revised, Oxford: Oxford University Press, 1983: 1027. Whilst panentheism maintains that God and the world are not identical (unlike pantheism, in which deity is \textit{wholly} immanent), the term is, in fact, difficult to define with exactness, because the distinction between God as a \textit{transcendent} Being and the reality included in God is notoriously imprecise. Citing Hans Frei’s famous phrase about hermeneutics, pan-thenism is thus a word that is “forever chasing a meaning” (Frei, Hans, \textit{Types of Christian Theology}, New Haven: Yale University Press, 1992: 16). The German philosopher Karl Krause (1781-1832) introduced the term as a means of reconciling pantheism and theism, maintaining that “God includes in His being, \textit{while transcending them}, both nature and humanity.” (See http://www.geocities.com/SoHo/Lofts/2938/poly2.html# panentheism, accessed 25.03.04, my italics). Krause goes on to say that “the world is a finite creation within the infinite being of God.” Matthew Fox, however, interprets panentheism as ‘all things in God and God in all things’, thus melting “the dualism of inside and outside – like fish in water and the water in the fish, creation is in God and God is in creation” (Fox, Matthew, \textit{The Coming of the Cosmic Christ: The Healing of Mother Earth and the Birth of a Global Renaissance}, San Francisco: Harper & Row, 1980: 57). Just as there are different varieties of pantheism (see, for example, the list of basic schools of pantheistic thought, which can be divided further, in Reese, William L., \textit{Dictionary of Philosophy and Religion: Eastern and Western Thought}, New York: Humanity Books, 1996 – hylozoistic, acosmic, immanentistic, stoic, emanationist, identity of opposites, monistic, relativistic monistic, and absolutistic monistic) so there appear to be different understandings of panentheism. Moltmann, for example, seems to give panentheism his own meaning, tying his interpretation to a strongly trinitarian theology of the cross: “In the hidden mode of humiliation to the point of the cross, all being and all that annihilates has already been taken up in God and God begins to become ‘all in all’.” (Moltmann, Jürgen, \textit{The Crucified God: The Cross of Christ as the Foundation and Criticism of Christian Theology}, London: SCM Press, 1974: 277).

\(^{124}\) Edward Bouverie Pusey’s translation of Augustine, \textit{The Confessions} VII, 7, in Hutchins, Robert Maynard (ed.), \textit{Great Books of the Western World}, Vol 18 Augustine, Chicago: Encyclopaedia Britannica Inc., 1952: 45. God’s ontological interaction with the world, or ‘world-System’ (a phrase used by Peacocke) is given spatial representation in a diagram in Peacocke, \textit{Paths from Science Towards God}: 112-113, a model which, as the author himself points out, suffers from the limitations not only of the two-dimensional plane of a text-book page, but also of impersonality: “if God is going to effect events and patterns of event in the world, then we cannot avoid attributing the personal predicates of intentions and purposes to God – inadequately and easily misunderstood as they are.” (ibid: 114).

\(^{125}\) See Alexander, \textit{Rebuilding the Matrix}: 330-359, for a comprehensive discussion of chance and necessity.

\(^{126}\) Alexander illustrates this type of chance – what he calls Chance A – as follows: “Out in the forest a deer is frightened by the sound of a hunter’s gun and runs into the path of an express train that happens to be passing at that moment. Both sets of events have separate causal antecedents and it is their intersection by chance that results in the death of the deer.” (ibid: 334).

\(^{127}\) Ibid: 334. Alexander discusses whether or not ‘chaos theory’ (which deals with situations in which outcomes are highly dependent on small variations in the starting conditions – the well-known ‘butterfly effect’) belongs to Chance A or this second category of Chance B, deciding to locate it – “for the sake of tidiness” – under Chance A “in recognition of the fact that it refers to classes of events that are unpredictable in practice, not unpredictable in principle.”

\(^{128}\) This understanding of chance – Chance C – is explicitly stated by Monod, who insists that “chance alone is at the source of every innovation, of all creation in the biosphere. Pure chance, absolutely free but blind, at the very
type of chance – not only because it rests on a number of false assumptions but also because it is purely descriptive and does nothing.\(^{129}\) Alexander argues that the first two types of chance are both very real in the world in which we live.

Tracing the relationship between chance and order in the origin and evolution of life at both the microbiological and the cosmological level, he suggests that if we rerun the tape of life, “given time plus chance plus natural selection plus the occasional catastrophe … it is not impossible that the rerun might not turn out so very different.”\(^{130}\) For Alexander, as for Peacocke and others, chance is not inconsistent with theistic top-down causation, as further supported by Ilya Prigogine, whose work demonstrates the creative interplay between chance and law within the evolutionary process.\(^{131}\) For Peacocke, chance is

the eliciting of the potentialities that the physical cosmos possessed \textit{ab initio}. Such potentialities a theist must regard as written into creation by the Creator's intention and purpose and must conceive as gradually being actualized by the operation of ‘chance’ stimulating their coming into existence … Hence we infer \textit{God is the ultimate ground and source of both law (‘necessity’) and ‘chance’}.\(^{132}\)

In this view, chance is God's ‘radar beam’ sweeping through the diverse potentialities that are invisibly present in every configuration in the world.\(^{133}\) So God might be expressed as the ‘determiner of indeterminacies’,\(^{134}\) operating in his universe with what Peacocke calls ‘self-limited omnipotence and omniscience’.\(^{135}\) We see here a God whose love for his creation is expressed in terms of the gift of \textit{autonomy} not only at the human level (free will) but also at the level of natural processes (contingency).

In an article in the CTNS publication \textit{Research News}, the theologian Keith Ward quotes from Tennyson's well-known poem \textit{In Memoriam}:

\begin{quote}
Who trusted God was love indeed
And love Creation’s final law –
Tho’ Nature, red in tooth and claw
With ravine, shriek’d against his creed
\end{quote}

Ward echoes the thoughts of many when he writes: “‘There can hardly be a theology of nature, if nature is such an amoral, purposeless, irresistible power.’\(^{136}\) However, challenging the simplistic arguments of those who, like Paley two centuries ago, exalt the ‘Designer God’ who has designed every detail of nature for the best, he argues that chance, accident and competition are all parts of the evolutionary process, though – crucially – they are not the products of sheer chance. There is no reason to suppose, he maintains, that a purposive Creator might not have set up the unfolding process of evolution so that it would eventually result in intelligent life. Denis Edwards observes that “although evolution is

the root of the stupendous edifice of evolution. This central concept of modern biology is no longer one among other possible or even conceivable hypotheses. It is today the sole conceivable hypothesis” in Monod, Jacques, \textit{Chance and Necessity}, London: Collins, 1972: 110, author’s italics, and quoted in Alexander, \textit{Rebuilding the Matrix}: 339.

\(^{129}\) \textit{Ibid}: 340. It is evident that Chance C is diametrically opposite to Peacocke’s theistic ‘top-down causation’.

\(^{130}\) \textit{Ibid}: 349, a conclusion resisted by reductionists like Richard Dawkins and Stephen Jay Gould, whose interpretation of sheer chance in the evolutionary process means that any number of reruns would result in any number of quite different outcomes.

\(^{131}\) Prigogine, Ilya, \textit{From Being to Becoming}, San Francisco: W.H. Freeman, 1980. See also Prigogine, Ilya and Stengers, Isabelle, \textit{Order Out of Chaos: Man’s New Dialogue with Nature}, New York: Bantam Books, 1984; Prigogine, Ilya and Nicolis, G., \textit{Exploring Complexity}, New York: W.H. Freeman, 1989. Stuart Kauffman draws from Prigogine in his proposal that organisms evolve the property of ‘evolvability’, so that even before the evolutionary process, though – crucially – they are not the products of sheer chance. There is no reason to suppose, he maintains, that a purposive Creator might not have set up the unfolding process of evolution so that it would eventually result in intelligent life. Denis Edwards observes that “although evolution is

the root of the stupendous edifice of evolution. This central concept of modern biology is no longer one among other possible or even conceivable hypotheses. It is today the sole conceivable hypothesis” in Monod, Jacques, \textit{Chance and Necessity}, London: Collins, 1972: 110, author’s italics, and quoted in Alexander, \textit{Rebuilding the Matrix}: 339.

\(^{132}\) Peacocke, \textit{Theology for a Scientific Age}: 119, author’s italics.

\(^{133}\) The metaphor of chance as the search radar of God was explored by Peacocke in an earlier work, and suggests a creative and imaginative dimension to God which is highly suggestive: see Peacocke, Arthur R., \textit{Creation and the World of Science}, Oxford: Clarendon Press, 1979: 95.

\(^{134}\) See, on this, Barbour, \textit{When Science Meets Religion}: 170-172.

\(^{135}\) The idea of a God who voluntarily limits himself in terms of both power and knowledge in order to allow his creation to exist in open-ended freedom is dealt with more fully in later stages of this book.

entirely dependent on random mutation, *evolution itself* is not random." So a coherent ‘theology of nature’ may reasonably reflect the wisdom of a God who has set in motion a process with a general direction and goal, but the realisation of that goal is left not only to the operation of the laws of nature but also to free choices, random events and other unpredictable interactions.\(^{137}\)

The possibility of integrating the insights of science and religion are further discussed by Barbour in the form of a Thomist-type synthesis, but without the dualistic categories discernible in Aquinas’ thinking. The vehicle he adopts for this ‘systematic synthesis’ is process philosophy. In the theological realm, process thought tackles the tension between divine transcendence and immanence by eliminating the transcendent God of classical theism. The emphasis is on God as one entity among others – God is therefore not ontologically different from the cosmos. In its rejection of the fixed, or unchanging, nature of reality, common in Western philosophy, process theologians focus on the dynamic process of becoming.\(^{139}\) They emphasise God as one who understands as a fellow-sufferer with all humanity, sympathetically interacting with human beings. Process theology is therefore attractive in presenting God as one who is responsive to the world. It is sympathetic to evolutionary models of a God involved in his creation, with all its attendant notions of chance and novelty.

One particular feature of process theology, as articulated by Barbour, is the identification of the Spirit with divine action and energy in creation, not only in a general sense but also in the particularity of divine initiatives.\(^{140}\) But its failure to account for the distinctively Christian idea of a God who is transcendent, and whose purpose is to offer hope to a suffering world, causes concern as to how much of a God is actually left. Ultimately, process theology has no eschatological promise: it offers no absolute victory over evil, as even Barbour has to admit. Accordingly, at the scientific level, it is not immediately clear “how such a scheme would be reconciled with contemporary cosmological predictions about the end of the present universe, which are that either a ‘Big Crunch’ or an infinite expansion will eventually lead to a state quite incompatible with life.”\(^{141}\)

Both theologically and scientifically process thought is problematic, but a number of contemporary thinkers at the science-religion interface are sympathetic to its insights, though with reservations. Ian Barbour acknowledges his debt to the concepts of process philosophy, but he is aware that “a single coherent set of philosophical categories may not do justice to the rich diversity of human experience.”\(^{142}\) In his desire to affirm that God both is causally independent of the world and interacts continuously with it, Peacocke rejects the two extremes of pantheism and classical theism. He recognises the value of process thought’s affirmation of divine responsiveness to events in the world, but criticises its over-emphasis on God’s *total* receptivity to all events in the world in a way that seems to allow God little discrimination: hence his preference for a panentheistic perspective. Another theologian who displays process sympathies is the Roman Catholic John Haught; although he makes a clear distinction between God and his world, he is keen to affirm the idea of a God who interacts compassionately and sensitively with human beings in their suffering. However, his description of God’s influence upon the world as persuasive love rather than domineering force steers him away from the distinctive redemptive work of Christ, and echoes process themes: “God struggles along with all beings, participating in both their pain and their enjoyment, ultimately redeeming the world by an infinite compassion – so that in the end nothing is ever forgotten or lost.”\(^{144}\)


138 Other dimensions to Barbour’s ‘theology of nature’ include the insights of feminist theologians who emphasise the pervasive dualisms that have characterised Western thought: they argue that dualisms like mind/body, reason/emotion, objectivity/subjectivity, domination/submission and power/love have male/female implications inherent in Western culture, in which the first term of each pair is often associated with science and its attempt to control nature. So patriarchal models of historical Christianity need to be re-evaluated in the light of insights from feminist theology. Barbour also points out that science offers the raw data to enable Christianity to articulate an environmental ethic based upon responsible stewardship of the earth, which can have sacramental significance. See Barbour, *When Science Meets Religion*: 32-34.


140 The activity of the Spirit within world religions – and not just within the Christian faith – is offered by Barbour as a helpful encouragement to interreligious dialogue: see Barbour, *When Science Meets Religion*: 179.

141 Southgate et al., *God, Humanity and the Cosmos*: 214.


144 Haught, *Science and Religion*: 69; although Haught is writing here within the framework of one who sympathises with the ‘Contact’ approach in the author’s typology, it is evident not only in other comments but also
Dialogue, Truth and the Postmodern Culture

In attempting to summarise the dimensions of dialogue discussed above, we should note Haught’s proposal that religion essentially fortifies the humble desire to know. This reflects his conviction – which he labels ‘confirmation’ – that religion actually supports the entire scientific enterprise. For Haught this is an epistemological issue: both enterprises – science and religion – seek to discover that which is true about reality. Haught reasons that science has religious – or theological – dimensions because scientists start from an a priori ‘faith’ that the universe is a rationally ordered totality of things; they believe that this real world hangs together intelligibly; they operate on the basis that the human mind has the capacity to comprehend at least some of the world’s intelligibility; and they accept that no matter how far we probe there will still be further intelligibility to uncover.145

Paul Davies claims that even the most atheistic scientist accepts as an act of faith that the universe is not absurd, that there is a rational basis to physical existence manifested as a lawlike order in nature that is at least in part comprehensible to us. So science can proceed only if the scientist adopts an essentially theological worldview.146

But if we insist with Davies that scientists must be ‘theologians’, then it is equally valid to demand that theologians must be ‘scientists’, at least in outlook if not in practice. We have argued that, methodologically, both disciplines take place within a framework of values, assumptions and interpretations. Both are involved in truth-seeking. If it is true that our world is an evolving world, in which God is involved in continuous creation, then science is constantly engaged in the enterprise of formulating models of a universe that is moving towards the new creation of Christian eschatology. Christians should be stimulated about the sort of future that science might propose, without losing sight of the biblical hope of the eschaton. It follows, therefore, that orthodox Christian faith must critique evolutionary models that postulate the gradual creation of perfected persons into a final state that is ultimately ‘this-worldly’. Christian eschatology anticipates a new creation that transcends the possibilities of this world, demanding that we think in terms of radical newness. Openness to the scientific endeavour must not destroy Christian hope in God’s radical intervention to bring about the new creation.147

We noted earlier in this chapter that the issues raised by the science-religion debate around the time of Galileo in the seventeenth century related in large measure to the problem of biblical interpretation. No one doubted the authority of the Bible: rather, they were wrestling with how that authority should be understood. This was important in Galileo’s time, because if the Catholic Church allowed alternative interpretations of biblical passages, such as those Galileo was presenting, then they might have to give ground to central Protestant teachings, thus undermining their own claim to be the guardians of biblical truth. We are reminded again of Brooke’s thesis that the science-religion relationship at any one time reflects the unique and particular demands of social or historical circumstance. All interpretation is an epistemological discipline within a particular historical framework, concerned with seeking truth, and in both science and theology ‘truth-telling’ ‘plays a critical role because the task is no less than trying to describe accurately, though incompletely, what God has done in the created order.’148 During the period of the Reformation, for example, Calvin

in the overall tenor of his writing that Haught is amenable to the insights of process theology. It is noticeable too that he prefers to write within a theistic framework which embraces the three great monotheistic faiths – Christianity, Judaism and Islam – rather than confining himself to the Christian faith, as both Barbour and Peacocke do.

145 Ibid; 23.
148 Alexander, Rebuilding the Matrix: 245.
argued that study of the created order through the natural sciences was of great value in discerning the existence of God, and his wisdom in creation. Brooke points out that it “has been well said of the Reformers themselves that the Bible was the sole norm and guide in matters of faith and conduct, not in everything under the sun.”

Calvin also taught that God’s self-revelation accommodates to the conditions of human beings, who are limited both in their understanding and by their cultural contexts. So God ‘adjusts’ to human capacities and minds: he ‘stoops down’ to our level, revelation expressed in terms of divine condescension. For example, in the biblical accounts of creation, the author of Genesis is communicating divine truth within a primitive worldview, accommodating to the understanding of the people of those days.

Throughout this chapter we have addressed a number of aspects of this search for truth in our discussion of the historical development of the science-religion debate, the rise of natural theology in the eighteenth century, the inherent rationality in both science and theology, and the more recent philosophical concept of critical realism. Whilst both biblical literalism and fundamental scientism have had their advocates and are still strongly championed in some quarters, contemporary developments in both science and theology suggest the growth of a more constructive interchange between the two disciplines. Southgate alludes to the contemporary renaissance in Barthian studies, reminding us, as we pointed out earlier in this chapter, that “Barth himself acknowledged that his Christocentric focus and starting point in Christian theology was by no means in tension with a recognition as to there being truth (what he referred to as ‘other lights’) outside the sphere of Christian faith.”

The point here is not that Barth’s position is being re-interpreted in any novel way, but that the current climate is encouraging a re-evaluation of Barth’s theological statements with regard to how God speaks today. If the constructive aspects of Barth’s ‘other lights’ were obscured by the prevailing context of liberal theology in the early years of the twentieth century, as well as by Barth’s own resolute stand against natural theology, the new millennium offers a radically new context for hearing Barth – without diminishing what Bonhoeffer calls his ‘positivism of revelation’ – as scientific insights open up new opportunities for understanding God’s world.

The contemporary postmodern culture – what Lundin has described as ‘the culture of interpretation’ – invites some final comments in this chapter on the structure of the science-religion dialogue within the framework of postmodern thought. The French social theorist, Jean-François Lyotard, argues that the essence of postmodernism is the “incredulity toward metanarratives”: that is, there are no overarching explanations of the human condition, such as those claimed by either Christianity or any other political or social ‘order’. However, postmodernism is, as hermeneutics was

149 Brooke, Science and Religion: 97; earlier, Brooke records Galileo’s quip that “the Bible teaches how to go to heaven, not how the heavens go” (ibid: 54).

150 In the development of his trinitarian theology of God and creation, Denis Edwards similarly resists a historical interpretation of the Genesis accounts of creation, preferring to view them as theologically rather than cosmologically authoritative for today. Edwards identifies a number of ‘salvific truths’ communicated in these creation narratives, truths that he takes with absolute seriousness. These truths are: the pre-existence and transcendence of God over all creatures; the ongoing relationship of all things to God as creatures to their Creator; God’s delight in creatures; the divine proclamation of the goodness of creation; the blessing that makes creation fecund; the creation of human beings in the image of God; the call of the human being to work with creation but also to take care of it as God cares for it; the social nature of the human person; the insight that male and female represent the divine image; the goodness of human sexuality and marriage; the reality of human sinful rebellion against God, bringing alienation from God, from other human beings, and from creation itself; and the enduring divine promise of salvation. These truths represent for Edwards truth as a trinitarian reality; his text holds together the Christian view of God and the insights of evolutionary science by rethinking our theology of the trinitarian God at work in creation (Edwards, The God of Evolution: 12-13).

151 Southgate et al., God, Humanity and the Cosmos: 63.


once described in the memorable phrase of Hans Frei, “a word that is forever chasing a meaning.” Inbody has referred to postmodernity as “intellectual velcro dragged across culture” — an adhesive label picking up anything random that floats across our culture. Whatever else one may think about such a label, at least it has the merit of alerting us to an important signifying motif in postmodernism: its rejection of transcendent absolutes of any kind. Taking a philosophical perspective, McGrath suggests that the heterogeneity of postmodernism argues against any generalised postmodern attitude to the natural sciences: what is more useful, in his view, is to explore “how anti-realism has become accepted — without any real engagement with the issues — as the working philosophy of postmodernism.” Anti-realism refers to the philosophical claim that the human mind freely constructs its ideas without any reference to an alleged external world. Just as the philosophical structure of postmodernism resists the grand récit of the Christian worldview, it also dethrones the privileged status of scientific knowledge, treating it “as one option in the worldview shelf displayed by multicultural societies in which occult or mystical worldviews may be looked on as equally valid.”

However — as discussed earlier — since both science and religion are involved in truth-seeking, both are attempting to chart objective reality and therefore cannot dispense with the notion of Lyotard’s grands récits. The problem with anti-realism for both science and religion, as ably demonstrated by McGrath, is that it espouses a social construction of reality that serves the interests and purposes of specific social groupings rather than responding to reality. Of importance here is the distinction he makes between weak and strong approaches to the relationship between social factors and the scientific method in the natural sciences. At the weak level, social factors evidently play a part in scientific discovery and theory, since historicity and social location inevitably determine access to the external world. A similar observation may be made with regard to the way communities of faith are shaped in their religious belief. In other words, social and historical factors condition the acquisition and representation of knowledge, whether, scientific, religious or social; but they do not determine it. The deterministic position characterises the strong approach, which allows no input from the external world of reality.

McGrath acknowledges the anti-realist attack on such despised ‘soft’ targets as religion, but he examines more critically the anti-realism of the strong social constructivists with regard to the natural sciences. Ultimately,

the critiques directed by postmodernity against the alleged claims to objectivity of the natural sciences proved embarrassingly self-referential. Most damming of all, postmodernity has signally failed to explain why it is the case that the natural sciences continue to produce useful knowledge.

McGrath’s anti-realist critique leads him to state that all is not well with postmodern thinking and to advocate a critical realist agenda. However, whilst postmodernism may resist the specific claims of the Christian faith at the level of dogma, it may have some important contributions within the context of Christian ministry. In my book Dancing in the Dark, I argue that we must look beyond the initially

155 Frei, Types of Christian Theology: 16.
158 Alexander, Rebuilding the Matrix: 239.
160 The contribution of communities of faith in the shaping of religious belief has been consistently articulated in the writings of Stanley Grenz, who argues that “theological construction needs no elaborate, foundation-setting, certainty-gaining prolegomenon. Instead, it arises out of the life of the discipleship community, persons who are joined together by the Spirit and who join together in living out the mandate they share. Therefore, presence within the Christian community itself leads to the theological task.” (Grenz, Stanley J., Renewing the Center: Evangelical Theology in a Post-Evangelical Era, Grand Rapids: Baker Academic, 2000: 214).
161 In his analysis, McGrath draws helpfully from the insights of Latour, who exposes the implausibility of social constructivism in the ‘hard’ targets, such as the natural sciences: see Latour, Bruno, We Have Never Been Modern, Cambridge MA: Harvard University Press, 1993.
162 McGrath, A Scientific Theology, Vol II: Reality: 191. Postmodernism’s lack of intellectual rigour is exposed in Sokal’s celebrated 1996 academic hoax, where the author mimicked postmodernism’s shallow, even ignorant, critiques of the natural sciences; for a summary of Sokal’s hoax and its implications for postmodernism, see ibid: 188-191.
negative interpretations of postmodernism, which question how Christians can ally themselves with a life-philosophy that rejects any notion of absolute truth and advocates not just an epistemological shift but an epistemological *vacuum* into which people are invited to construct their own versions of reality, with the inevitable consequences of ethical pluralism.

In an evangelical response to postmodernism, Erickson distinguishes between two varieties of postmodernism, which he labels ‘hard’ and ‘soft’, echoing the strong and weak distinction advocated by McGrath with regard to social constructivism. Hard postmodernism reflects the radical deconstructive elements of the movement, which deny objectivity and rationality, and takes up an extreme pluralistic position with regard to truth. Soft postmodernism, on the other hand, rejects dogmatic naturalism and antiscientificism and ‘the type of naïve objectivity that denies the effect of historical and cultural situations. In other words, it rejects logical positivism, behaviourism, and all other artificially scientific approaches to reality.’[165] This distinction leads Erickson to view hard postmodernism as a threat to Christianity, but to support the presence of soft postmodernism as an encouragement to believers ‘to contend for the truth of the Christian faith, in contrast to a secular world that formerly excluded any faith of this type.’[166]

The redeeming feature of soft postmodernism for Christian ministry within the contemporary cultural context may be its opening of the door to new and optimistic expressions of freedom, imagination and creativity, epitomised in the challenge to Le Corbusier’s architectural straight lines. Right-brain creativity, with all its ambiguities, flamboyance, irreverence and stylised pastiche, offers hope and encouragement (if at times only transitory) to a generation tired of structure, order and left-brain sterility. It is too easy for those who mourn the loss of stable values and the abandonment of unequivocal truth-statements, particularly in the realm of theology, to dismiss this more positive evaluation of postmodernism for the practice of Christian ministry.[165]

If the soft variety of postmodernism has something to say to us by virtue of its challenge to a hierarchically-structured and propositional way of ordering and presenting reality, then it may have a contribution to make to the conversation between the natural sciences and the Christian faith, without our having to endorse its intrinsically fatal philosophical weakness.[166] The idea of dialogue coheres well with a number of insights implicit in postmodern thinking, one of which is a holistic interpretation of reality. It has frequently been observed that Western thought has been characterised by dualistic interpretations of reality,[167] such as mind versus body, objective versus subjective, reason versus

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165 See Buxton, Graham, *Dancing in the Dark: The Privilege of Participating in the Ministry of Christ*, Carlisle: Paternoster, 2001: 173-186; it will be noted here that the *philosophical* underpinnings of postmodernism are not being advocated: rather, the *experiential* consequences are acknowledged as relevant within the context of a more sympathetic engagement with the contemporary postmodern culture. McGrath comments on the philosophical appeal of anti-realism for certain postmodern writers “not on account of its intellectual credentials, but on account of its intellectual consequences. It thus serves the agenda of postmodernity well, in that all can be accounted for as a human construction which may immediately be deconstructed by those with the necessary skills to yield a more pleasing intellectual artefact in due course.” (McGrath, *A Scientific Theology*, Vol II - *Reality*: 178, author’s italics).
166 This fatal weakness has been summarised by Alexander: “The claim that there is no ‘grand narrative’ that can validate particular forms of human knowledge is of course itself a ‘grand narrative’ on a majestic scale which itself lacks validation, and indeed there seems no particularly good reason for believing it. The beliefs of postmodernism therefore find themselves hoist by their own petard in rather the same way the Logical Positivism came aground on the realization that its own claims could not be validated by empirical data. In some ways postmodernism is in a worse position than this, because its new ‘grand-narrative’ – that no branch of human knowledge can be legitimated – must, if believed, lead to the conclusion that the claims of ‘postmodernism’ themselves comprise a language-game that need not detain us for very long. Indeed, it is difficult to avoid the slide from such conclusions into futility and cynicism. If various branches of human knowledge are ultimately mere sets of language games, why bother to play them? We may as well stick to trivial pursuits.” (Alexander, *Rebuilding the Matrix*: 241).
167 See, for example, Barbour, *When Science Meets Religion*: 32-33, 129-132. For a helpful introduction to the dualistic separation between the sacred and the secular, see Brown, Robert McAfee, *Spirituality and Liberation: Overcoming the Great Fallacy*, London: Spire; 1988; and Walsh, B. J. and Middleton, J. R., *The Transforming Vision: Shaping a Christian World View*, Downers Grove: IVP, 1984: 93-105. In an extensive series of volumes on dualism, Fontaine argues that dualism exists where “there are two systems or concepts or principles or groups of people or even worlds that are utterly opposed and cannot be reduced to each other … One of the two is always thought to be of a much higher quality than the other, so much so that one pole is always seen as distinctly inferior, fit to be neglected, repudiated, or even destroyed.” (Fontaine, Petrus Maria, *The Light and the Dark: A Cultural History of Dualism*, Amsterdam: J. C. Gieben and Gopher Publishers, 1986-2002). The term ‘dualism’ was actually coined at the beginning of the eighteenth century in the writings of Thomas Hyde, a Professor of Hebrew
emotion, and – by implication – science versus religion, even evolution versus creation. Postmodernism prefers to think in holistic terms, in which we conceive of a fluid web of knowledge, rather than hierarchical and reductionist constructions built upon fixed foundations of right versus wrong. The notion of dialogue therefore sits well – at a conceptual level – with this idea of web-like connections of belief and insight.

We have elucidated hard postmodernism as a highly subjective enterprise, challenging the concept of objective reality. Not only does Erickson’s hard version seek to pull the carpet away from under the feet of many scientific claims, but Christianity also finds itself under attack as objective ‘truth-claims’ about the ‘God who is’ are repudiated. However, both science and Christianity may find common ground within the contemporary postmodern climate with the acknowledgment that both stand on the threshold of ultimate mystery. In an editorial in the CTNS Research News and Opportunities, Karl Giberson argues that there is no abstract, universal scheme into which ‘timeless truths’ of both science and religion can be placed once and for all, snugly juxtaposed and eternally secure. Human beings know a tiny bit about the world and an even smaller bit about God. But the bit that we don’t know – the Cloud of Unknowing – is so much larger. And in that larger cloud lies the possibility that what may seem to be contradictory truths are not what they seem. [This may be] the beginning of wisdom.

The danger, of course, is that ‘wisdom’ may be interpreted in an epistemologically suspect way, serving as a disguise for a pragmatic pseudo-reconciliation of incompatible beliefs. This seems to be where Giberson is heading when he invites us to “suppose that we do not define compatible beliefs as ‘those that can be philosophically reconciled’ but rather ‘those that can be simultaneously believed.’”

Whilst the idea of a ‘cloud of unknowing’ resonates more sympathetically with a critical-realist understanding of a reality which is not limited to what can be observed, rather than with the anti-realist presuppositions underlying the more radical philosophical underpinnings of postmodernism, the

at Oxford University. He, like many others, referred to the ancient Persians, especially their notion of two principles, one eternal and one created. Fontaine disputes this, insisting that dualism as such cannot be traced to a historical origin. For him, it has always existed: it is not so much a historical phenomenon as an anthropological one: “It occurs in every conceivable field of life, in religion and philosophy, in history and politics, in literature and art, in social relationships and in personal life. Wherever we are looking, we see people grappling with or suffering from or trying to accommodate themselves to unbridgeable oppositions. We are in presence of a general human phenomenon; since it fundamentally forms part of our human make-up, we are entitled to call it anthropological. The origin of dualism is not to be found in history or mythology, in philosophy or religion (not even in the dualistic Iranian religion), but in the human condition.” But the term can be most easily understood with reference to the metaphysical ideas of Plato, who postulated two worlds, “a world of sense, always in flux, and a unified world of Ideas, not available to our senses but only to thought, which alone are fully knowable” (Hare, R. M., Plato, Oxford: Oxford University Press, 1983: 13). In The Republic these two worlds are defined in terms of the higher world of knowledge, on the one hand, and the lower world of opinion on the other. In Plato’s thinking, the dimension of knowledge is subdivided into pure thought or intelligence and mathematical reasoning, which alone are capable of apprehending the intelligible world of Forms; and the dimension of opinion is subdivided into belief and illusion, which reflect the nature of the physical world in which we live (see Plato, The Republic, translated by H. D. P. Lee, London: Penguin Books, 1955: 231-286).

Gregersen likens the concept of a web of beliefs to a raft with planks, in his outline of a ‘contextual coherence theory’ for the science-theology dialogue: so human knowledge is viewed as an intersubjective enterprise, “like a raft with planks of different size and color. The raft as a whole (the web of beliefs) is corroborated by the planks (the truth-candidates) that constitute that raft, and knowledge is enlarged when new planks are added which fit into the raft and strengthen its structure. No plank forms a raft in itself but is only a distinctive part of the raft, and belongs as such to the family of planks constituting the raft as a whole.” (Gregersen, Niels H., “A Contextual Coherence Theory for the Science-Theology Dialogue”: 189). The ‘coherence model’ directs us from the foundational notion of a ‘chain of knowledge’ to the web-like ‘raft of knowledge’. For Gregersen, though the model “always prefers stronger ties of interconnection, it also allows for looser connections between different epistemic approaches to reality. In this respect the coherence model can be seen as steering a middle course between critical realist and nonintegrative approaches to the interface of science and theology, though coherence is closer to the former than the latter.” (Ibid: 227, my italics).


171 This statement underscores Bhaskar’s distinction between epistemology and ontology – the epistemic fallacy “that statements about being can be reduced to or analysed in terms of statements about knowledge”: see Bhaskar, The Possibility of Naturalism: 38, and McGrath, A Scientific Theology, Vol II- Reality: 218-219.
themes of mystery, wisdom and wonder have a suitably postmodern ring about them. They resist clear
definition and boundary. The Princeton theologian J. Wentzel van Huyssteen suggests that, as a result
of the contemporary postmodern challenge,

many of the stereotyped ways of relating theology and science through models of conflict,
independence, consonance, harmony, or dialogue are revealed as simplistic generalisations about
the relationship between these two dominant forces in our culture. The challenge so typical of
postmodernist pluralism not only implies a heightened awareness, and a historical sensitivity, to
the shifting boundaries between theology and science, but in fact makes it impossible even to

Ultimately van Huyssteen’s approach favours the primacy of what he calls ‘experiential
accountability’, which “reveals that in both theology and the sciences we relate to our world
epistemically through the mediation of interpreted experience” 173 within the context of living,
developing and changing traditions.

Whilst contemporary scientist-theologians like Ian Barbour, John Haught and Arthur Peacocke
gravitate towards a process-type of integration between science and religion, the philosopher Holmes
Rolston III insists that science needs religion in order to make sense of its discoveries and theories – it
needs the wisdom of God to keep science humane, to give it a conscience:

too much emphasis on the pragmatic utility of science is increasingly likely to obscure the most
genuine reason for doing it, which lies in the joy of, and human need for, inquiry into the nature
of things … Among the humanities, religion pushes science toward questions of ultimacy, as well
as of value, and it can keep science from being blinkered, or, more elegantly put, religion can
keep science down. 174

This notion of wisdom is characteristic of postmodern thought, particularly in its resonance with ethical
issues of justice and ecological concern for the physical world in which we live.

In his concluding comments in an edited book on the relationship between science and the quest for
spiritual truth, the philosopher Philip Clayton notes appreciatively the stress placed by contributing
scientists on the spiritual life at a personal level, a recognition that empirical knowledge is not all there
is, that there are questions that lie beyond the domain of the natural sciences. These questions often
lead to a sense of wonder:

when you raise questions of ultimate meaning, when you ask about the beauty of a mountain lake
or a Mozart symphony, when you experience wonder at the sheer size of the universe or the
complexity of its structures, you concentrate on experiences that are not, at least not directly, part
of the subject matter of the natural sciences. 175

At the scientific level, that wonder may translate into a sense of mystery implicit in such notions as the
curvature of space and the phenomenon of quantum mechanics, reminiscent of Niels Bohr’s famous
comment that “whoever says they understand quantum mechanics does not understand quantum
mechanics.”

Commenting on Rahner’s understanding of God as unfathomable mystery, Denis Edwards notes
“the ever-amazing mystery of our own profound inter-connection” with the incomprehensible
processes in the cosmos, leading to a more ‘theological’ interpretation of the cosmos itself: “The
experience of the profound mystery of our existence in relation to a wondrously mysterious universe
can open out into self-acceptance before Holy Mystery.” 176 For Edwards, this may be viewed as an
authentic experience of the Spirit of God at the heart of creation. An appreciation of wonder and
mystery – whether it is triggered by a profound awareness of humanity’s place in the cosmos, the
affective experience of a Mozart symphony or the intellectual bafflement at quantum mechanics –

172 van Huyssteen, J. Wentzel, “Postfoundationalism in Theology and Science: Beyond Conflict and Consonance”
in Gregersen and van Huyssteen, (eds), Rethinking Theology and Science: 13-49
173 Ibid: 45.
175 Clayton, Philip, “Some concluding reflections” in Richardson, W. Mark, Russell, Robert John, Clayton, Philip
and Wegter-McNelly, Kirk (eds), Science and the Spiritual Quest: New Essays by Leading Scientists, London and
176 Edwards, Denis, “Ecology and the Holy Spirit” in Pickard, Stephen and Preece, Gordon (eds), Starting With the
resonates with the ‘soft postmodern wisdom’ that challenges the purely dispassionate analysis associated with rationalistic scientific endeavour.

The Quaker scientist Jocelyn Bell Burnell expresses this well at a personal level:

Whilst attributes like academic argument, careful experimentation, clear thinking, physical insight and logic are important, I also honor and value qualities such as beauty, compassion, connectedness, empathy, genius, glory, insight, inspiration, the numinous, wisdom, and wonder.177

Human beings do well to take stock of their own lives, and to ask, with Eliot, “Where is the Life we have lost in living?” Immediately preceding this search-ing question, Eliot remonstrates against the incessant, and ultimately fruitless, pursuit of idea and action that drives us further from God, rather than towards him:

The endless cycle of idea and action,
Endless invention, endless experiment,
Brings knowledge of motion, but not of stillness;
Knowledge of speech, but not of silence;
Knowledge of words, and ignorance of the Word.
All our knowledge brings us nearer to our ignorance,
All our ignorance brings us nearer to death,
But nearness to death no nearer to God.
Where is the Life we have lost in living?
Where is the wisdom we have lost in knowledge?
The cycles of Heaven in twenty centuries
Bring us further from God and nearer to the Dust.178

For those who are engaged in Christian ministry, seeking to articulate the gospel of Jesus Christ in a way that resonates with the culture of pluralism and tolerance, a culture which responds sympathetically and often unquestioningly to the claims of the scientific community, the invitation is to listen with openness to what the natural sciences are saying without peddling a trite and unthinking Christianity. That same invitation is open to scientists: it is the invitation to lift their eyes higher, to look beyond the academy, the observatory and the laboratory, because both science and religion “ultimately flow out of the same ‘radical’ eros for truth that lies at the heart of our existence. And so, it is because of their shared origin in this fundamental concern for truth that we may never allow them simply to go their separate ways.”179

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179 Haught, Science and Religion: 203.