

# Ernan McMullin and Critical Realism in the Science-Theology Dialogue

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## Chapter 1

# Contemporary Natural Theology and Critical Realism in Science and Theology

One approach in which the issue of critical realism has been framed is natural theology. Natural theology is a form of reflection that takes its structure of questioning from the discipline of philosophy and its point of departure from the world as given, to speak about God as creator. So it is logical that an analysis of select lectures by scientists in this field would yield a set of fruitful reflections on the relationship between scientific and theological knowledge. Moreover, it follows that the three scientist-theologians selected for analysis in this chapter would discuss the God–World relationship in their Gifford Lectures. The experience of God as *creator* is pivotal for the entire Christian theological tradition. It is the chief locus of concern in both natural theology and the science–theology dialogue.<sup>1</sup>

### Scientist-theologians and the Gifford Lectures

Natural theology has been the focus of the Gifford Lectures, a prominent series of lectures that have become a culturally privileged forum for addressing the topic. The three thinkers I named in the introduction, Ian Barbour, Arthur Peacocke and John Polkinghorne, have been prominent recent Gifford Lecturers. They delivered Gifford Lectures in 1989–90, 1993 and 1993–94 respectively, each of which has been published in book form. As such, they have committed themselves to reflections in the science–theology dialogue from within the general parameters of the natural theology tradition.<sup>2</sup>

Their common objective is to describe a cognitive and epistemological basis to theological claims regarding the natural universe. There are, none the less, distinct and important differences among these thinkers. It is worth noting in particular the contribution of John Polkinghorne. His examination of credal theology with an eye on science in *The Faith of a Physicist* addresses the estrangement of redemptive and revelational theology from the science–theology discourse. Polkinghorne’s choice marks a significant though not utterly unique break from the natural theology of previous Gifford Lectures. Simultaneously, it marks a break from the philosophical approach to God that characterizes the bulk of reflections in the science–theology dialogue.<sup>3</sup>

Since the Creed is a form of theological language that arose in the context of a specifically Christian tradition centred on the redemptive experience of Christ’s disciples and the Christian church, Polkinghorne’s point of departure requires that we pay attention. His focus on the Creed may hold a clue to a problem in the science–theology dialogue. Perhaps the notion of critical realism, in defining what is acceptable as

knowledge, has left out too much of what is theologically distinctive. Polkinghorne argues convincingly in his work that faith, redemptive categories, human historicity or revelation theology should not be avoided. In speaking explicitly of faith, Polkinghorne indicates that theology needs to claim more than its recovery of cognitive and epistemological dimensions.

In suggesting that the God–World question in theology implies taking up the issue of knowledge, it is equally implied that the critical realist theory of knowledge is involved. Since the worldviews of thinkers like Barbour, Peacocke and Polkinghorne address the God–World question, they each require appraising in terms of how their views on knowledge and worldview cohere. They hold a common position on the nature of knowledge. But do they successfully account for God as a distinct object of theological knowledge? If so, how? Are they explicit in what makes up a claim to knowledge in regards to both the world and the world *vis-à-vis* God? Through a better understanding of the meaning of critical realism on the part of each thinker, I argue here that their theological positions can be freshly clarified and open to constructive expansion.

Until recently, critical realism was virtually unchallenged in the science–theology dialogue. Now, with a wave of critiques concerning critical realism’s alleged oversights in the science–theology dialogue, this position requires a thorough re-examination.<sup>4</sup> The selection of the three Gifford Lectures is thus a natural point of departure for such a re-examination. Barbour, Peacocke and Polkinghorne already provide key elements for adopting a wider philosophical framework.<sup>5</sup>

My aim is to reinforce what the three Gifford Lecturers emphasize as the cognitive locus of theological knowledge, given the correlations that exist outside theology. A focus on critical realism alerts theologians to how to deal with the complexities of appropriating subject matter that is steeped in conflicting philosophical allegiances.<sup>6</sup> However, I shall argue that, although each Gifford Lecturer defends critical realism with common terms and references, each of them develops the term with respect to different discourses. This is especially apparent in the case of Polkinghorne. In spite of a shared descriptive phrase designating how theology and the sciences understand the reality that they investigate, there exist important differences in their understanding of what critical realism means for theology. This divergence is why the issue of critical realism, their common methodological position, deserves a systematic analysis. If the methodological question cannot be settled with some assurance, then it is unlikely that agreement on specific theological interpretations of nature or science can ever be resolved.

Each lecturer advances the belief that theology contains cognitive content. Theology does not refer to arbitrary sets of religious language expressed differently according to the religious outlook of a particular tradition or culture. Each lecturer’s contribution as it pertains to critical realism will be analysed. As it stands, Ian Barbour, Arthur Peacocke and John Polkinghorne have set out to identify and describe the implications of historical conflicts, contemporary scientific findings and certain philosophical areas of discussion for Christian theology.

Two concerns emerge in reading these lectures and their other published work on this question. The first deals with the depth of philosophical acumen that each lecturer brings to his theological inquiry. There is an *aporia* over the degree and range within which human rationality has been utilized to support the position of critical realism

in science and theology. A risk emerges when theology attaches itself to an idealist interpretation of science for fear of being unable to relate to empirical inquiries. Systematic theology becomes idealist when it attaches itself to the most speculative aspects of science. This is a risk for a theology of divine action that wants to utilize the indeterministic aspects of quantum mechanics to leverage a dimension of reality in which God's action in the world can be identified. Those who investigate such proposals are dedicated to seeing how quantum mechanics can be interpreted in a less speculative light, but nevertheless the concern remains, at least for the present.

The second concern raised by a reading of these lectures is whether these theologians select too liberally from the scientific data to suit their theological purposes. The problem is the degree to which scientific sources have been understood and represented well. To the degree that science and scientific rationality are philosophically skewed, there are indirect consequences for theology. To the degree that theological knowledge is skewed, there are also consequences for whether a dialogue with science will be authentic. Bearing in mind Polkinghorne's stance on faith, for instance, how does his departure from natural theology disclose a problem in the way that theological knowledge claims are treated in the science–theology dialogue? Do the differences among Polkinghorne, Peacocke and Barbour on this subject undermine the apparent agreement over critical realism?

In response, this study will explore a theological reflection that aims to provide an explanatory account of a critical realist view of knowledge. This question is crucial in view of the entire neo-Kantian move to conceptually construct objects as the precondition for knowing these objects by subjects. The quote from Wright describes this situation well. We know from within certain human contexts. For this reason, Nancey Murphy calls critical realism a truism.<sup>7</sup> The three Gifford Lecturers being examined here develop the term in connection with specific problems that render the term a problem rather than a description or a truism. Barbour develops the term critical realism in relation to religion and religious claims from its usual locus in science. Peacocke develops critical realism in relation to a theological systematics that depends, for its part, on a biologically oriented theological anthropology. Polkinghorne develops critical realism in relation to the basic claim that faith is reasonable.

In short, this study argues that in these thinkers, there is an *incomplete* critical realist philosophical framework, because on the religious side of the dialogue at least, the term is developed with three different purposes in mind. As this chapter will show, for Barbour, critical realism is developed with attention to dialectical oppositions and their foundational resolution, inspired by contemporary debates in the philosophy of science. For Peacocke, critical realism is developed as a tool for understanding how to systematically integrate theological notions in an interdisciplinary context. Polkinghorne, finally, is concerned to show the reasonable status of doctrines in theological discourse. Critical realism offers the epistemological basis for doing this. These three purposes appear to be similar, but in fact are quite different. While these three different aims are related and not necessarily contradictory, there is insufficient evidence to suggest that each thinker refers to a common or identical position of critical realism.

On the scientific side, I want to make the case that these diverse theological interpretations of critical realism draw on a similar descriptive approach to science and scientific rationality. While this is correct so far as it goes, they ignore the

cognitively rich elements of human rationality. While this common employment of the term ‘critical realist’ from philosophy of science helps identify their advocacy of a general critical realist epistemology, their lack of reference to an explanatory perspective limits the extent to which critical realism is exploited as a legitimately profound philosophical discovery. On the contrary, this study seeks to show that critical realism is genuinely a philosophical discovery, yet one whose meaning has been taken for granted.

In the following analysis of Barbour’s *Religion in an Age of Science*, Peacocke’s *Theology for a Scientific Age* and Polkinghorne’s *The Faith of a Physicist*, the focus will remain on the specific contents of each thinker’s proposed critical realism. This analysis will outline the resources marshalled in defence of critical realism, the main insights each thinker makes into it, the implications arising from these insights, and a summary theological evaluation of these three critical realisms.

## Ian Barbour

I will begin with Barbour. His interpretation of critical realism is directly inspired by Thomas Kuhn, especially his agreement with Kuhn’s notion of paradigms that mark off different periods of normal scientific investigation from one another. As is well known, Kuhn’s notion of paradigm was introduced spectacularly through his book *The Structure of Scientific Revolutions*.<sup>8</sup> In the wake of the critical turn in philosophy, Barbour identifies models and theories which attempt to correspond with an aspect of the reality of the world. Models and theories are inherently limited, however. They comprise internal or epistemological limits to knowledge. A model exemplifies this understanding of knowledge as being ‘an imaginative tool for ordering experience, rather than a description of the world’.<sup>9</sup> For Barbour, the correspondence between scientific data with theories on the one hand and religious experience with belief on the other hand is ample justification for a Whiteheadian metaphysic that stresses the interconnected web of reality, understood in complementary ways, according to one’s particular approach. Barbour’s critical realism is nothing less than a renewal of a theology of nature, something Barbour has stressed as his own particular goal.

Among our three thinkers, Barbour was the first to deliver the Gifford Lectures. He delivered them at the University of Aberdeen in 1989. The title of these lectures was first published as *Religion in an Age of Science*. It has since been re-published as *Religion and Science: Historical and Contemporary Issues*, and remains perhaps the most well-known religious engagement with the natural sciences in the history of the Gifford Lectures.<sup>10</sup> Barbour’s work has since been lauded as the standard text by which other science–religion discourse is evaluated.<sup>11</sup> This is especially true with respect to Barbour’s famous fourfold typology for science–religion interaction: conflict, independence, dialogue and integration.<sup>12</sup>

For Barbour, critical realism is an epistemological breakthrough that occurred during the mid-twentieth century. It opened up a new view on the achievement of knowledge across disciplinary boundaries, especially in the sciences. The reason for this shift was the demise of scientific positivism beginning with the modest critiques of Karl Popper and later with the rise of the historical school, beginning in the early 1960s. Barbour’s use of Kuhn’s *The Structure of Scientific Revolutions* is matched

only by an appreciation of Michael Polanyi's book *Personal Knowledge*.<sup>13</sup> Barbour also mentions a similar theory of scientific research programmes by philosopher of science Imre Lakatos.<sup>14</sup> But it is really Kuhn and the historicist movement to whom Barbour gives credit for advancing critical realism in the philosophy of science. According to Kuhn and others, science advances as a community of knowledge in different stages. It does not advance, as popular optimistic portraits previously advocated, in terms of sets of logical deductions from empirical proofs.

Barbour has advocated critical realism from 1966 onwards as a physicist and a religious believer. It is not surprising that he criticized scientific positivism, beginning with his book entitled *Issues in Science and Religion*.<sup>15</sup> Positivism, after all, was widely understood to be hostile to religious claims. Positivist philosophy emphasized deductions from sense observation confirmed in experimental verification, while religion and theology referred to knowledge of the unobservable, or what came to be known disparagingly in such circles as 'beliefs'. During the 1960s, empirical positivism was transformed through Karl Popper's more sophisticated and more modest theory of falsification. This theory marked off scientific knowledge from all other forms of knowledge, and confirmed for many the judgement by C.P. Snow that the pursuit of knowledge existed in two separate and distinct 'cultures'.

The 1997 edition of Barbour's Gifford Lectures is divided into four sections: 'Religion and the History of Science', 'Religion and the Methods of Science', 'Religion and the Theories of Science' and 'Philosophical and Theological Reflections'.<sup>16</sup> Parts 1, 3 and 4 summarize the historical and contemporary contents of the dialogue. This treatment includes figures and topics as diverse as Newton, Darwin, evolution, the anthropic principle and creation. The second part deals specifically with the notion of critical realism as an explanation for what comprises a knowledge claim, and for how the disciplines are mediated. Critical realism is explored in Chapter 5. The sections in that chapter are entitled 'The Structures of Science and Religion', 'The Role of Models', 'The Role of Paradigms' and 'Tentativeness and Commitment'.

Barbour's earlier book *Issues in Science and Religion* includes a foundational definition of critical realism that is repeated and qualified in *Religion and Science*. His early definition states:

*Critical realism* acknowledges the indirectness of reference *and* the realistic intent of language as used in the scientific community. It can point to both the extraordinarily abstract character of theoretical physics *and* the necessity of experimental observation which distinguishes it from pure mathematics [...] If the goal of science is to *understand nature*, we can unify the concern for empirical testing found in positivism with the concern for intellectual coherence found in idealism, while avoiding the exclusive preoccupation of either.<sup>17</sup>

Critical realism, therefore, introduces the possibility of methodological unity and cohesion in scientific rationality because it tries to take up the concerns of two opposed schools of thought. This unity embraces both experimentally tested entities and the theoretical constructs employed in truly understanding those entities.

Later, in Barbour's Gifford Lectures, he repeats his earlier definition and relates it to its wider philosophical significance. 'Critical realism' is introduced as the best explanatory term available in science-religion discourse, because it is more than just useful:

Against instrumentalism, which sees both scientific theories and religious beliefs as human constructs as useful for specific for specific human purposes, I advocate a critical realism holding that both communities make cognitive claims about realities beyond the human world.<sup>18</sup>

Barbour asserts that both theology and the sciences refer to an extra-mental reality. Furthermore, critical realism involves the ‘meaning of truth’, not some all-encompassing definition of truth itself. Truth is not grasped totally, but is aimed at. Critical realism means a ‘correspondence with reality [...] because reality is inaccessible to us’.<sup>19</sup> Following Kuhn, Barbour stresses the contingent nature of scientific activity in the construction and verification of hypotheses. Because this activity is contingent, Barbour concludes that truth *per se* is inaccessible. The meaning of attaining truth is more important than its propositional fact.

These statements diverge from the classical realist position that objects are known as they really exist through rule-governed human cognitional activity. Such rules stipulate that inferences are made on sound deductive or inductive principles and therefore adhere to solid logic. However, Barbour’s critical realism couches the priority of the real or ‘ontology’ in terms of the less certain word ‘meaning’. What does this nuance mean? As we shall see, Barbour defines a number of parameters regarding the ability of science to arrive at truth statements.

One of these parameters is the suggestion that scientific activity is largely a task of weighing and deliberating among a cluster of virtues or criteria in order to decide which scientific theories correctly explain empirical data. Truth is attained through a combination of several criteria in scientific judgement. Having gone beyond positivism, Barbour agrees that there is not a single logical or mathematical criterion for a theory’s agreement with the data. This is also the case with respect to the way in which Karl Popper formulated the view of falsification. Correspondence with reality is conceived differently from the ‘naïve realist’ position on knowledge due to a combined set of criteria acting as the correct evaluation of scientific theories. According to Barbour, these criteria for the truth of theories are: (1) agreement with the data, (2) theory coherence, (3) theory scope and (4) theory fertility. The last criterion is especially important for its associations with Kuhn’s accent on the problem-solving, pragmatic activity of scientific communities.<sup>20</sup> However, it does not stand alone in scientific inquiry and theory evaluation. Barbour criticizes the positivist movement in the philosophy of science for relying on univocal criteria for characterizing scientific rationality. The positivist insistence on equating reality with what we sense or logically deduce is naïve. In contrast, he says, ‘the realist asserts that the real is not reduced to the observable’.<sup>21</sup>

As I suggested already, perhaps the most characteristic feature of Barbour’s critical realism is his position that structural parallels exist between science and religion. Indeed, he believes that they share similar epistemological structures. He believes that parallels exist between data and theory in science on the one hand and experience and belief in religion on the other hand. It is on the basis of this supposed parallelism that dialogue between the disciplines can be fruitful.<sup>22</sup> We understand in different disciplines, according to Barbour, due to essential similarities in disciplinary structure. This is true with respect to the use of models and evident paradigms in science or religion/theology.<sup>23</sup> The religious phenomena of beliefs and religious experience influence each other in mutual modification.



Barbour's understanding of the role of theory lies in terms of the existence of models. He draws connections between ways of interpreting data in science and interpreting experience in religion as parallel quests for truth. In so far as the stages of knowledge are identifiable within religion and science, Barbour cites a critical realist position that is substantially different from standard treatments in the philosophy of science. Of course, the difference is that Barbour extends critical realism into the understanding of religion and religious knowledge. In both science and religion, 'models and theories are abstract symbol systems, which inadequately and selectively represent particular aspects of the world for specific purposes'.<sup>24</sup> In both areas, there exist a common reference to reality and truth through different paradigms in a continual, transitory and progressive process.

The critical realist parallels between science and religion demonstrate Barbour's goal, which is to address 'the challenge to religious belief ... from the assumption that the scientific method is the only road to knowledge'.<sup>25</sup> Borrowing from critical realists in the philosophy of science, Barbour argues that since the natural sciences use theoretical tools such as models and metaphors in advancing knowledge, their presence in religion should be seen as a strength in making religious knowledge claims, not a weakness. This is an important element in his Gifford Lectures, because it permeates the entire description of the structural parallels in religion and science. As such, it constitutes for Barbour the defining element of critical realism.

Using Kuhnian terminology, Barbour expresses his reliance on the philosophy of science for understanding religion and theology by describing theology as either 'normal' or 'revolutionary'.<sup>26</sup> While this may be analogously helpful to describe the history of theology in terms of stability and change, Barbour actually implies more than this. He implies that theology's ability to communicate religious knowledge at different times through different traditions is bound by a paradigm structure. Hence, the constraints on theology to make knowledge claims appear as prominent as the constraints he sets on the explanatory intent of the natural sciences.

An example marks his position even more clearly. Barbour augments his argument for structural parallelism in religion and science by comparing the use of personal and impersonal models for God within a greater 'paradigm community'. Religion in the west and east is thus similar to the wave and particle models that describe subatomic reality in quantum physics.<sup>27</sup> The structural parallels between the disciplines are articulated analogously yet strongly in this example. As objects of the disciplines in these examples, God and light are comparable in the sense that they are each understood as a duality. Realism is not abandoned. It is qualified by an agnosticism inherent in the ontological concept of complementarity. Thus complementarity is a category that Barbour works with in order to characterize scientific and religious models of reality, even though he does not articulate it explicitly as such.<sup>28</sup> As such, complementarity is key evidence that results from a critical realist view. Critical realism implies a worldview. It is evidence that the reference to truth, models and metaphors in scientific rationality yields the distinct possibility of a holistic, conceptual view of the universe.

A holistic, unified worldview is a central possibility arising from Barbour's adoption of critical realism. This indicates that Barbour is really arguing for a philosophical position on the science–theology exchange. According to Barbour, it is plausible for a general metaphysic to mediate the similarly structured disciplines of

theology and the sciences. One of the reasons Barbour is able to carve out this position is due to his studied avoidance of narrow theological goals. He respects the integrity of the sciences with regard to the purpose of a metaphysical position without presuming any interpretive theological *a priori*.

For Barbour, critical realism implies a quality of knowledge in science and religion. It is tentative knowledge. In science, this is well understood because of the central role given to hypotheses. But this tentativeness is something that Barbour is anxious to emphasize in religion as well. This understanding of the tentativeness of critical realism is extended by Barbour to religion's own polarities: faith and doubt. For Barbour, one's personal involvement incorporates an attitude of personal trust and confidence. However, he argues that this should not become 'blind trust', and he proposes a commitment to methodical self-criticism and doubt. For Barbour, doubt is essential and involves 'calling into question every religious symbol'.<sup>29</sup>

Where does this all lead? Barbour identifies process thought as the tradition that best grounds these epistemological parallels and their implications. The parallelism that encompasses and structures each discipline is significant for allowing a metaphysical mediation. This meaning is expressed in the ongoing search for truth, our grasp of which is never finalized, even in extraordinary discoveries. For Barbour, the methods of science are metaphysically significant, since they can be understood as a holistic ensemble. Scientific method is not just anti-positivist, it is a form of meaningful experience. The act of modelling and the employment of values that serve as criteria in scientific theory evaluation attest to the possibilities of metaphysics. Realism can be thus derived as meaningful rather than abstract. It incorporates religious knowledge. Critical realism cannot be reduced to a logic that represents empirical reality.

Process gives metaphysical credence to a form of unity that recognizes tentative knowledge. Barbour describes this tentativeness as the ever-present *via media* between different 'polarities':

in which the first term [is] more prominent in science and the second in religion: objectivity and subjectivity; rationality and personal judgment; universality and historical conditioning; criticism and tradition; and tentativeness and commitment.<sup>30</sup>

Religion is clearly anchored in subjective experience for Barbour. As such, 'some features of religion seem to be without parallel in science ... Religion is indeed a way of life'.<sup>31</sup> Yet although the emphases are different in science and religion, a dialectical structure of direct and reflective knowledge remains intact for each.<sup>32</sup> There is thus a tension over the similarities and differences between science and religion. This raises further significant questions about whether they do cohere as disciplines that are more or less objective and subjective by degree. Perhaps the differences are more in kind than Barbour allows.

What does Barbour's interpretation of critical realism suggest for Christian theology? Barbour's last chapter, entitled 'God and Nature', includes some clues that expand a bit further the process thought metaphysic. Barbour chooses to broaden the process metaphysic by calling on the meaning of relationality and extending it into God. This comprises Barbour's theology of nature, and his understanding of God. In it, he moves beyond the issue of methodological parallels among the disciplines. He

moves to depict the God–World relationship and the character of God. Here is where the results of religious critical realism bear theological fruit.

For Barbour, the category ‘process’ encompasses a theological metaphysic that is epistemologically based in this subject–object relationship. It does not infringe on the way we know in any one discipline necessarily. Process thought’s chief virtue lies in what it ‘allows’. By proposing a process understanding of God, Barbour affirms that God possesses a dipolar nature with a subjective and objective pole. This mirrors human understanding. As one who continually creates, God maintains an ongoing relationship between creator and created. God’s duality is a frame of reference that is both transcendent and immanent. Since religion parallels science, process thought pertains to both disciplines. Process thought is thus the key interdisciplinary and ontological expression of critical realism.

In a scientific vein, entities are understood in process thought as self-creating ‘actual occasions’ following Whitehead’s line of thought. Process is articulated as the underlying order, as the general character of reality.<sup>33</sup> The category process suggests time as a primary category, and it affirms the interconnectedness of events. Thus it sees reality as an organic process, a web of entities involved in efficient and final causation.<sup>34</sup> Metaphysically, since entities possess value, they provide ‘an ongoing contribution to the life of God’.<sup>35</sup> So, although Barbour draws out an outline of the theological models, metaphors and paradigms in his chapter on methodology, he brackets these considerations when coming to make explicit theological existence claims. He chooses instead to rely more exclusively on the process metaphysical tradition to discuss God. This is in fact one of the features of process theology that is not commonly admitted by its adherents, namely the decidedly kataphatic mode of language used to describe God or God’s action.

Process thought accounts for the universe in terms of God’s activity. Having a dipolar nature, God can be expressed as creating the universe *ex nihilo*. However, Barbour goes on to affirm that the ontological structure of entities chiefly concern *relationship*.<sup>36</sup> The God–universe relationship is important in a way beyond what Barbour feels is contained in the traditional creation doctrine. The ontology of relationship extends to one between the universe itself and its ground of being and becoming. God’s activity in the world is best understood through reference to a ‘single conceptual scheme’ that neatly brings together both God’s creating activity and God’s redeeming activity. The advantage of process thought lies in being able to account for both these types of divine activity without opposition or contradiction. For Barbour, this virtue of process thought contrasts with many dualist accounts in historical and contemporary models.<sup>37</sup>

For Barbour, the process metaphysic allies with a portrait of intelligibility gained through realism. As a meta-philosophy, process thought indicates an ontological extension of realism. What is consistent between Barbour’s application of critical realism in epistemology and his adoption of the process metaphysic is a reliance upon *dialectic*. Dialectic is present in the tentative act of knowing as well as in the known object that is conceptualized through complementarity. This dialectic is extended into God’s dipolarity by virtue of personal and impersonal models of God.<sup>38</sup> Thus Barbour commits himself theologically by placing the dialectic that characterizes his interdisciplinary methodological parallelism into God. Barbour works from the epistemological tensions between faith and doubt, subject and object, and data and

theory by incorporating dialectical tension in his process model for God. God's life can be adequately accounted for in terms of immanence and transcendence, a complementary pair of basic divine attributes.

How can Barbour's proposal be evaluated?<sup>39</sup> First of all, it is striking how Barbour develops an understanding of critical realism and its applicability to the sphere of religion. Critical realism is borrowed from the sciences as a result of new insights in the philosophy of science and applied to religion. It is the philosophy of science to which Barbour refers most frequently in his writings, with some references to works in the philosophy of religion. For Barbour, since science is a successful domain of human reasoning, it may assist religious scholars to understand religious language, its range of meaning and intent. The legitimacy granted to theology is an extension of insights made in the philosophy of science. Theology's legitimacy is not granted by virtue of its own historically shaped forms of reasoning or particular insights identified in its modern history. This decision of Barbour's to build a definition of critical realism is crucial, and it obliges any evaluation such as this one to at least begin with a similar starting point, which partly explains why the next chapters deal largely with the work of McMullin.

This dependence on the lessons of the philosophy of science is also crucial in the context of Barbour's dependence on Kuhn and process thought. A troubling ambiguity arises from the tension between a realist account of the operations of science and the historicist account of science in Kuhn's work. Kuhn was reluctant to affirm genuinely realist claims on scientific knowledge. He leaned in a historicist direction, especially in his later writings, precipitating a trend in the philosophy of science towards seeing historical context as much more determinative of scientific method and discovery.<sup>40</sup>

But another qualification Barbour makes strikes me as more important. He offers another key element regarding theology that Kuhn and most philosophers of science would have been unable to appreciate. This is through his reference to analogy. He notes that: [L]ike scientific models, religious models are analogical.<sup>41</sup> Religious and scientific models are based on human language. In both science and religion, models are analogical, yet they lead to beliefs. However, in the case of religious knowledge, Barbour notes, stories are qualitatively different ways of communicating meaning. Critical realism is able to account for this religious form of models, but not literally as in the sciences. By seeing stories or narrative as an extension of the scientific model for making sense of religious experience, Barbour stretches critical realism beyond the parameters of a knowledge claim into the realm of meaning. Barbour's goal of methodological parallelism stretches what is usually thought of as a fundamental discontinuity between scientific and religious knowledge. In religious reflection, there is a more central role for analogy in characterizing theological knowledge. Analogy has been employed historically because it is a form of reason that accounts for the utter dissimilarity by those who experience a transcendent, atemporal God. In amending Barbour's reflections, I will argue in the final chapter that it is justifiable to argue for theology's dependence on analogy as different from science's use of analogy.<sup>42</sup>

Analogy raises a larger question. As science employs analogical models in order to understand empirical reality, could we not suggest a more fundamental contrast with theology's analogical reference to a non-natural reality? Certainly, the idea of a non-natural reality goes against the thrust of process thought's stress upon God's

involvement in a relationship with the world. But, the contrast between these different uses for analogy perhaps explains why narrative and the study of religious texts is completely different from the terms and relations of analogy in scientific rationality.

A reading of Barbour's Gifford Lectures reveals an extraordinary confidence in dialectic, complementarity, dipolarity and other forms of duality. This metaphysical duality originates in his affirmation of the realist intent of critical realism. The following statement is the most conceptually strong of all his statements: 'Realists insist that being is prior to knowing'.<sup>43</sup> Here, one can see that Barbour, despite his accent on Kuhnian thought, presupposes a duality of being and knowing, ontology and epistemology. Is Barbour therefore still captive to the dualist philosophies he wants to overcome? Such questions become more pressing when we focus on Barbour's explanation of knowledge strictly in terms of subjective communities shaped by conceptual paradigms on the one hand and the reality of the non-human world on the other hand. Is this philosophically legitimate? Is this the best way to account for scientific or theological knowledge claims? Barbour is suggesting that a dialectical view is best understood along diachronic (Kuhnian) paradigms. He also allows for the possibility of Lakatosian research programmes as well. But perhaps Barbour's account of scientific and religious knowledge leaves unanswered a deeper understanding of knowledge than relationality and duality can provide. For Barbour, let us recall, duality is emphasized in terms of epistemologically parallel structures and ontological complementarity. However, this still places too much subject-object tension at the heart of a position on knowing and understanding. This tension is evident in Barbour's own position that each of these are present in scientific and theological rationality by degree. The process metaphysic demonstrates how the universal presence of relationality is dialectical and religiously meaningful. However, Barbour's emphasis on dialectic leaves the God-universe relationship causally unexplained beyond the statement that relationality is present. Is there more to be understood? Put another way, can critical realism be construed with different theological implications than he is able to provide?

Furthermore, it is not certain how the epistemological parallels Barbour highlights in his version of critical realism necessitate a metaphysical position, let alone a particular metaphysical position. Barbour's quest for unity and interdisciplinary integrity is advanced by noting similar epistemological structures. That is true. Process, on a reading of Barbour's interpretation of it, integrates the disciplines without reducing either discipline to a form of the other as some popularizers of process thought have tried. But Barbour presumes that science and religion pertain to different ways of understanding aspects of the same reality. Further, the process metaphysic does not account for progress in knowledge and the significance of this interpretation of the history of science. This theme of progress is significant, I believe, as will become clear in future chapters. There is in Barbour an epistemological underdetermination of metaphysical claims that requires probing and extension. Can critical realism come to mean something with more philosophical scope? Could there be a better way to argue for a metaphysic in which the epistemological elements of critical realism are held as differentiated elements in the achievement of knowledge? Otherwise, it may be the case that metaphysics overlays the disciplines as an ideal category without adding any meaning to their knowledge and operations.

In attempting to clear up some of the ambiguity around the meaning of realism in science, I argue that attention to the history of science and the history of scientific

realism needs to be incorporated. Barbour's revisions to his Gifford Lectures have already attempted this. In the 1997 edition of those lectures, his insertion of an additional 75 pages treating the most important historical controversies in the period from the seventeenth to the nineteenth centuries represents an interesting decision on his part. What is missing from this survey, however, is an evaluation of these issues with an eye to see if critical realism is verified in this historical record. What is missing is an examination of different knowledge claims in light of these historical case studies.

Barbour's work, as encyclopaedic as it is, offers little explicit connection between his Kuhnian, historically conceptualized concept of critical realism and the implications of this position. Both are well developed as separate accounts. He envisions the unity and integration of a metaphysical orientation to critical realism. His coverage of historical issues does indicate that no metaphysical reflection on knowledge should go unaware of historical contingencies that shape such attempts. He adopts a metaphysical position without proposing detailed criticisms or too many prescriptive amendments of other positions.<sup>44</sup>

Barbour's turn to the theological task of appropriating the science–religion dialogue in order to emphasize God's place in the universe and his relationship with the universe is the major step in his argument. Barbour's Christian process theism is omnipresent in his lectures, but it remains disconnected from the religious 'version' of critical realism. None the less, Barbour is correct in demonstrating that critical realism is the epistemological breakthrough beyond positivism that allows an integrative approach to knowledge.

In summary, Barbour's definition of critical realism depends on a notion of truth seen in terms of correspondence with natural reality. There is, moreover, a direct metaphysical implication that reality is fundamentally unified as a single process. Religion and science are different ways of understanding this reality. A philosophy of language is assumed on Barbour's part. Science and religion employ similar sorts of tools, from metaphors to models, in revealing the character of God and nature. However, this method of realizing a unified worldview is a key to explaining why opposition to critical realism in the science–theology dialogue has now emerged. While Barbour retrieves a metaphysical worldview from his general presentation of critical realism, he leaves critical realism vulnerable on the issue of language and to the charge of being a truism. Apart from this, these elements of critical realism comprise a significant synthesis of previous attempts at proposing a realist view of the world with an eye to describing the religious stake in human rationality that is implied.

### **Arthur Peacocke**

It is therefore prudent to investigate another Gifford Lecturer to see what a less metaphysically indebted view of critical realism would offer. Can the unity that Barbour seeks be framed in a way that places metaphysics more at the service of the disciplines, instead of being an assumed conceptual framework? Arthur Peacocke's Gifford Lectures offer just the kind of theological response that builds on Barbour's generalized account along these different lines. Indeed, Peacocke's work, with its

emphasis on christology, is oriented towards identifying a theological solution to a similar starting point in nature as epistemology and scientific rationality.

Arthur Peacocke's application of critical realism from the philosophy of science into systematic theology will now be analysed and evaluated. Peacocke is inspired by the rise of critical realism in a similar vein to Barbour. However, more than Barbour, he has stressed the roles of metaphor and analogy in achieving knowledge, especially in theology. Indeed, Peacocke intentionally develops systematic theology as a distinct enterprise, whereas Barbour does not. As such, theology possesses a vested interest in a multi-levelled view of the universe in some agreement with the inquiries of the other disciplines. Unlike Barbour, Peacocke opts for a more nuanced metaphysical approach that is not indebted to any particular philosophical tradition like process thought. Instead, he emphasizes the role and significance of human personhood as an emergent feature in the unfolding of life. Moreover, human persons are oriented to their own self-transcendence. Peacocke selects the christological dimension of theology as an ideal response to the historical and anthropological fact of self-transcendence. The result is a constructive theological programme. However, while Peacocke proposes a viable theological worldview, he remains tentative on the distinct characteristics of rational investigation pertaining to both scientific and theological inquiry.

Like Barbour, Arthur Peacocke addressed the topic of critical realism extensively before delivering his Gifford Lectures. Peacocke's reflections are first evident in *Intimations of Reality*,<sup>45</sup> which is the publication of his Mendenhall Lectures. However, starting earlier in his 1978 Bampton Lectures, published as *Creation and the World of Science*,<sup>46</sup> Peacocke showed a reluctance towards an explicit philosophical metaphysic as a tool to integrate the disciplines. Since then, compared with Barbour, Peacocke has repeatedly appraised knowledge more in terms of disciplinary limits in tandem with a project of elaborating a theological systematics.

Like Barbour, Peacocke states his allegiance to critical realism for understanding how knowledge is achieved in theology and the natural sciences. Instead of process metaphysics, he describes the theological significance of the relationships among three poles in Being: God, humans and the world. This frames his Gifford Lectures as a whole, as the subtitle indicates. The similarities with process thought are evident, and certainly Peacocke assumes that some sort of metaphysical underpinning to interdisciplinary knowledge is present. However, he suggests that it is inadequate to argue that world and God are in mere relationship. Peacocke wants to make a systematic theological account of this relationship. He wants to stress a comprehensive worldview, without employing the technical language of philosophical categories.

Peacocke spells out the meaning of critical realism in *Intimations of Reality*. The insights from this work are then condensed and transposed in his Gifford Lectures. In both works, Peacocke narrates critical realism's rise. This is illuminating since, like Barbour, Peacocke sees the re-emergence of realism in science as the result of dissatisfaction with positivism. However, he is more explicit regarding another problem in the philosophy of science. From a scientific positivism during the 1920s to the 1940s, there followed an over-exuberant preoccupation with the sociology of scientific knowledge in the 1960s and 1970s. Peacocke takes issue with this later preoccupation. Thus realism re-emerges as attention 'to actual scientific practice, both historical and contemporary [...] it is basically a philosophical position'.<sup>47</sup>

Why philosophical? Because, according to Peacocke, the return to a realist position in science is ‘linked with the much vexed philosophical problem of the nature of “truth”.’<sup>48</sup> Nevertheless, the question then becomes an equally contentious debate about how realism is plausibly defended. Is realism defended with reference to theories or the entities discovered in scientific experiments? At this point, Peacocke breaks off from the narrative and turns to a brief analysis of models, not only in science, but also in theology.

Using the work of Janet Soskice as a guide, Peacocke argues for the ‘high’ view of models in scientific practice, over against a naïve realist or instrumentalist view of models in science. Models mediate theory and possible phenomena as theoretical, imagined constructs. These constructs are never literal. As Peacocke notes, this is theologically significant, because science does not involve empirically certain or literal knowledge, an assumption that has been central in theology for some time. Models require a theory of language. In particular, they require a theory of metaphor, in order to show how science explains. The metaphor explains what the model identifies analogically. Analogy, therefore, is the kind of knowledge that scientific models provide in the process of constructing the most adequate theories. Scientific theories are dependent on the analogical models that give rise to theories in an ongoing process of discovery and modification. They are not autonomous, mathematically based deductive schemes as positivism envisioned, according to Peacocke. While vital differences exist between scientific and theological models, the analogical element is similar and crucial. The ‘reality ... believers seek to depict is one that the creature cannot claim to describe as it is in itself – *ex hypothesi* God as transcendent is beyond all explicit depiction whether by language or visual image’.<sup>49</sup>

Yet paradoxically, at least as I contend, theology and science are ‘mutually interacting approaches to reality.’ Both aim to ‘depict reality.’<sup>50</sup> Rather than serving as an explicit theological or scientific epistemology for understanding the world, critical realism is a position that highlights personal knowing in general. So reality is not reduced to logical sets of theories. Neither is reality ‘predominantly socially conditioned’, into which theology adds a further dimension of social meaning.<sup>51</sup> The result of applying critical realism to theology illuminates the basic human condition of being persons who know. In general, then, Peacocke’s articulation of critical realism resembles Barbour’s, although there is marginally more dependence upon a theory of language and the theological utility of models than is the case with Barbour.

Unlike Barbour, Peacocke treats critical realism somewhat less comprehensively. He does not provide details on the mode of explanation or knowledge attained in scientific inquiry. A likely explanation is that Peacocke is devoted to proposing a theological systematics, a concern that first arose in his 1979 work *Creation and the World of Science*. The interdisciplinary and epistemological concern of critical realism thus plays a secondary role in framing Peacocke’s more theologically oriented inquiry. That is, Peacocke does not develop it beyond what Barbour provides.

Nevertheless, there are certain peculiarities of Peacocke’s understanding of critical realism that deserve a mention. Peacocke summarizes his position with reference to the philosopher of science Ernan McMullin’s definition of *scientific* realism. The significance of this move will emerge from the discussion of scientific realism in



the next chapter. Quoting from McMullin's article 'A Case for Scientific Realism', Peacocke agrees with McMullin's claim that:

The basic claim made by such a critical scientific realism [...] is that it is the long-term success of a scientific theory that warrants the belief that 'something like the entities and structure postulated by the theory actually exists'.<sup>52</sup>

Peacocke cites with approval this statement where existence is the issue. Peacocke refers to the history of science in support of critical realism. But he stops short of buttressing his position with a detailed historical analysis. Before moving into a discussion of theological subjects, Peacocke pauses to clarify his interpretation of critical realism by commenting on its basis in a 'theory of reference':

[...] the realism is always qualified as 'critical' since the language of science is [...] fundamentally metaphorical and revisable, while nevertheless referring [...] this position of critical realism as regards the status of scientific propositions inevitably involves some theory of reference.<sup>53</sup>

He cites the work of Soskice once again to support of a theory of language which anchors scientific knowledge in a way that is consonant with religion and theology. As with Barbour's assumption of correspondence, this linguistic theory of reference affirms the presence of metaphor and analogy in both disciplines.

In expanding Barbour's more limited criticism of social constructionists in a philosophy of science, Peacocke's account of science takes into consideration the socio-historical critiques, but in a new way:

the theory of reference on which a critical realism rests will include an overt social perspective, for this enhances our understanding of the way in which the reality of a referent persists through change in theory and is gradually established in a community by a critical winning process.<sup>54</sup>

The positive contribution to knowledge which Peacocke ascribes to science's social contingencies marks the historicist interpretation of the philosophy of science. But he turns the critique around in order to affirm a broader notion of the knowledge arising from scientific activity in social settings. This is a significant judgement on Peacocke's part. He embraces the investigations of science's historical contexts, but not the historicist conclusions that are usually drawn by many historians of science. As such, he parallels Barbour's caution concerning strictly historicist readings of science. As well, he acknowledges social factors in theory deliberation. Yet Peacocke does not deliberately define critical realism in light of these factors, at least in the theologically oriented Gifford Lectures.

What do Peacocke's reflections on critical realism imply? On this question of metaphysical implication, the differences between Barbour and Peacocke are pronounced. The reason for this is due to the fact that Peacocke rapidly turns his attention to a view of nature as a hierarchy of communicating levels, not a (more abstract) process. The differences in metaphysical taste may have to do with the fact that Barbour is a physicist, and Peacocke a biologist. Peacocke has especially insightful suggestions concerning the human as a 'microcosm' of the universe itself.<sup>55</sup>

Human persons span the four levels of the universe: (i) the physical world, (ii) living organisms, (iii) the behaviour of living organisms and (iv) human culture.<sup>56</sup>

This proposal is made in the interests of establishing a worldview. The clearest indication that Peacocke sees this proposal as the result of critical realism is made earlier in *Intimations of Reality*:

If we adopt such a skeptical and qualified realist interpretation of scientific theories and models, then it behooves us to take seriously the picture of the natural, including human, world that contemporary science depicts.<sup>57</sup>

In drawing together a portrait of a natural hierarchy of parts and wholes, Peacocke spends considerable effort depicting the world, and the various disciplines, as both parallel and multi-layered.

This is the thrust of his Gifford Lectures, and it comprises the background to Peacocke's decision to offer a christological component to his theological argument. The reason behind his choice to speak of natural, human and divine as different communicating levels of the universe is to theologially extend the natural world's multi-levelled reality into the human domain. For Peacocke, the scientific disciplines are not only related among themselves, they also pertain isomorphically to hierarchical levels of complex systems. Again, he sees this as significant for a critical realist, because each science has its own distinctive level of operation. The implication is that theology is also distinctive, and part of the spectrum of disciplines. It has its own role to play.<sup>58</sup>

What is also significant is that Peacocke's 'top-down' and 'bottom-up' causal processes act as two different natural causal vectors, giving theology a specific explanatory function concerning the action of God. Peacocke highlights 'top-down' causation generally:

the role of top-down causation in no way derogates from that of 'bottom-up' causation. But the need for recognition of the former is greater because hardly anyone since the rise of the reductionistic scientific methodologies doubts the significance of the latter.<sup>59</sup>

What is top-down causation? It is something that has a real significance for living systems. Peacocke sees it as:

changes [...] of the constituent units [...] *because* of their incorporation into the system as a whole, which is exerting specific constraints on its units, making them behave otherwise than they would in isolation.<sup>60</sup>

There is a 'further epistemological implication', which is that:

our epistemological analyses correspond, however inadequately and provisionally, to realities which must be deemed to exist at the various levels being studied – that is, they also have an ontological reference, however elusive.<sup>61</sup>

Where top-down causation becomes really significant for Peacocke is through realizing that the communication between different levels of the universe occurs within human life. Such a depiction of communication implies a *telos* and purpose to the universe.

This can be justly supposed as the fruit of Peacocke's investigations in molecular biology. The life of a cell cannot be understood by understanding the different individual constituents of a cell. It has to be understood as a whole unit. The same holism applies to the integral structure of human meaning and history. The 'natural' existence of top-down causation intensifies and complexifies in the higher levels of living organisms and species. For this reason, among others, Peacocke sees good reason to view human history as a distinct causal vector of top-down action in the human species. It is through our capacity for self-awareness that we become human, a process unique to human beings that involves coming to terms with death and the purpose of life.<sup>62</sup>

It is this presence of purpose or existential meaning at the human level that is pivotal here. It is where theology and science make overlapping claims about reality. In the lead-up to his christological reflections, Peacocke goes on to emphasize human personhood. The word 'person' takes on added meaning in the cross-traffic of bottom-up (biological) and top-down (cultural and religious) causation. We are 'self-transcendent'.<sup>63</sup> Peacocke provides a lucid and crisp definition of what this signifies:

Self-awareness and self-consciousness, coupled with our intelligence and imagination, generate a capacity for self-transcendence which is the root from which stems the possibility of a sense of the numinous – and so of the divine [...].<sup>64</sup>

Through this prism of human self-awareness in the context of nature, the question of God emerges, as this study will make clear after considering the specific limits encountered in the discipline of cosmology. We shall return to the theme of self-transcendence in connection with Peacocke's development of this idea in Chapter 5.

The God question is a personal question. As personal, however, it is also a natural question. This expressly echoes, in fact, the position expressed at the Catholic Church's First Vatican Council (1869–70) on the possibility that one can obtain a natural knowledge of God without the aid of supernatural revelation. It is a question that is more than either intellectual or existential, taken separately. There are two distinct forms of questions that Peacocke sees as the ground for speaking about God: the search for intelligibility in the 'inference to best explanation', and the search for personal meaning. Nevertheless, he admits that we cannot avoid merging the two searches into one. We proceed 'by urging our questions about the cosmos in forms that include ourselves [...]'.<sup>65</sup> While this reflection on the distinct searches for truth and meaning is brief, it supports Peacocke's metaphysical position. He terms this position 'non-reductive emergentism'. His extended treatments of God, christology and theological anthropology follow from this metaphysical position.<sup>66</sup> Peacocke, however, does not argue for it as a metaphysical position. He does not argue for it as a logical extension of a critical position on knowledge. As such, his short Chapter 6, 'Asking "Why?": The Search for Intelligibility and Meaning', is an important stage in his move from a view of knowledge and nature to a view of God. The bridge indicates an importance to the value of questions and the act of questioning.

As for the theological meaning of personhood, Peacocke stresses *communication* by and among persons, including God, who is 'supra-personal'. The choice of vocabulary is carefully thought out. Peacocke resists the term 'supernatural' or anything which connotes God's absolute transcendence, and has reinforced this point in discussion with me.<sup>67</sup> Communication is a more specific concept than relationality.

It is the expression of top-down divine activity mirrored by our self-transcendence ‘upwards’.<sup>68</sup> Given our understanding of hierarchies in nature, and of ourselves as self-transcendent creatures, God’s transcendence, both within and beyond the world, is affirmed in an extension of what naturally emerges. This leads Peacocke to espouse panentheism. Although this theological concept is not emphasized by Peacocke in his Gifford Lectures, he has been more forthcoming on this concept in recent publications.<sup>69</sup> Panentheism conceptualizes hierarchies of nature with communication in mind as the general category which affirms a theological realism without the doctrinal propositions of traditional formulations. It captures the two-sided nature of God: God’s transcendence, and God’s immanence.

Theologically, Peacocke allows considerable leeway for further clarifications to amend his conceptually unified proposal. For example, he is anxious to stress God’s ‘general revelation’ based on the Pauline theological impulse, expressed in Romans 1:19–20, that knowledge of God is diffuse and available to all of humanity. This leads to his affirmation of the Holy Spirit in terms of divine communication and top-down causation. As a critical realist, Peacocke affirms both the individuality of religious experiences on the one hand and the necessity of affirming a human ‘causal joint’ between God and World on the other hand.

Peacocke is not satisfied with what he sees as a satisfaction on the part of theologians for merely affirming God’s action as analogically similar to ours. Peacocke argues for a realist interpretation of theology in order to affirm *how* God exercises influence through the multi-layered events in the world. This, in turn, suggests the need for a more adequate theory of human action (how the mind and body interact akin to top-down causation) in order to obtain a better theory of analogy to speak of God’s action. Peacocke ends his section on God with a broad consideration of models of God and divine action that might resemble such a solution in analogy.

However, his position does not explicitly arise from his critical realist epistemology. This is the frustrating aporia that we already saw with Barbour’s work as well. Peacocke tentatively adopts a panentheist model of God’s relationship with the world. Yet this is still a model. As such, it does not expand his theological knowledge claim beyond what is already stated through his reflections on personhood and communication. By discussing models so positively, however, Peacocke contrasts his position with the ‘two realm’ or mutual independence image of science and theology. Theology is critical realist because its aim is to ‘articulate [...] by means of metaphor and model, experiences of God [...]’.<sup>70</sup> Consequently, for Peacocke, theology needs to pay attention to the critical realist perspectives available in the sciences about the world, including the human. However, is theology critically realist merely by proposing models in similarity to the sciences? Is it not possible to see theology’s models and forms of analogical knowledge as unique due to theology’s distinctly different object, namely God?

In summary, Peacocke sees critical realism as a position that sustains scientific and theological claims better than instrumentalism, historicism or empiricism. However, it is not clear why critical realism is an insight that contains theological significance beyond strictly epistemological questions. As with Barbour’s account of the notion, Peacocke’s critical realism remains descriptive. Furthermore, there is no reason established by Peacocke as to a connection between critical realism and the God–World panentheistic model, just as it is elusive to find a connection between

Barbour's critical realism and process thought. In short, we are dealing with a separate track for epistemology and metaphysics, according to both thinkers. How we know and what we know remain unrelated areas of inquiry, a situation that demands resolution.

History and language remain areas for specific theological inquiry, a natural outcome of Peacocke's attempt to move beyond describing the possibility of doing theology to actually proposing a theological systematics with human identity at the centre of concern. Hence, his final section on theological anthropology is devoted to a portrait of the human in this light. This is where his christological focus emerges as a distinct form of reflection. Peacocke sees the life of Jesus as a life that fulfils the personal search for meaning by a radical confrontation and triumph over death.

How do we evaluate Peacocke's metaphysical and theological implications of critical realism? The ambitious theological reflections seem incongruous with his modest portrayal of critical realism. Furthermore, christology seems an unlikely destination for Peacocke to reach, since natural theology has historically avoided references to christology. The connection that seems to bind Peacocke's different poles of Being is the quest for a unified worldview, the same quest that leads Barbour to embrace the category of process. Peacocke, however, does not emphasize the conceptuality of such a unity. His limited discussion of panentheism is as far as he is prepared to go in this direction. Instead, at least initially in his Gifford Lectures, he turns to the different disciplines that positively express the levels of hierarchy.

Isomorphic hierarchies of disciplines and natural levels of entities best characterize the universe. At the apex of this hierarchy stands the human being in the natural hierarchy, and the disciplines of human culture in the hierarchy of disciplines. Peacocke is directly concerned with addressing theological problems raised by the natural sciences, biology and other specializations that are oriented around the human species. Barbour does not do this directly. For Peacocke, there is religious significance in the very notion of personhood, a microcosm of the multi-layered, hierarchically organized universe. The implication, though not accentuated by Peacocke himself, is that a critical realist epistemology permits such an explicitly theological project to go forward.

The widespread occurrence of communication among and between levels of reality – notably between nature, humans and God – is of paramount importance to Peacocke. This coheres with Peacocke's biological interests and his argument against reductionism. For nature, humans and God to be inter-related, his biological imagination is at work here in seeing a universal organism, a pantheist system taking shape. But Peacocke also provides a theological rationale for the possibility of revelation in harmony with a natural theology. What is unclear is whether Peacocke's account, with its christological climax, adequately coheres with the particularities of faith and revelation that lie beyond the scope of an overarching natural model of God's being and activity. Does there need to be a further distinction made at the boundary of fact and meaning, between nature and history, between knowledge and divine revelation? Perhaps this distinction threatens the unified system Peacocke proposes. Could critical realism help demarcate such a distinction in knowledge, a systematic theology that demarcates the known from the unknowable?

The answer to these questions may lie in the very portrait of human existence that Peacocke presents. The theological question is: What portrait of human rationality

gives us positive evidence to suppose that a divine creation of the world can be affirmed as theological knowledge? The key insight that Peacocke overlooks when he defines a theological version of critical realism is his earlier claim concerning a basic twofold nature of human questioning as that of truth and meaning. The limit of Peacocke's critical realism lies in his lack of attention to a truly detailed account of rationality in relation to the God–World relationship. The possibility that theology, as a discipline, lies ultimately beyond the limits set by critical realism can be argued on the basis of Peacocke's very own reflections in Chapter Six of *Theology for A Scientific Age* concerning this basic twofold structure of questioning. So the question becomes whether the connection between God and meaning can really remain within the ambit of a critical realist epistemology, at least as he understands it.

The fact that within the human domain these various levels of reality are inter-related is testimony to the viability of a theological anthropology that understands both a unity and a teleology to human identity. Peacocke suggests that 'the other' emerges within the human at the layer of culture, implying the distinctiveness of the transcendent dimension to human discourse and striving. This is clarified in terms of the transcendent nature of persons. Like other existing beings, we are greater than our constituent parts. Unlike other existing beings, our transcendence is not understood through recourse to a biological principle.

Peacocke's subsequent move from this discussion to a presentation of christology is a move that draws on previous theological strategies of articulating the God question in terms of a christology-from-below.<sup>71</sup> This is reinforced by his belief that a weak version of the 'anthropic principle' offers theology an ability to make sense of the questions of meaning which arise from within the realm of intelligibility.<sup>72</sup>

In conclusion, Peacocke offers a systematic theology that incorporates a christologically informed idea of God within the horizon of human understanding. His accent on the complementarity of knowing and known in his critical realist epistemology is described in relation to knowledge of the world. However, his divergence from Barbour on a concept of God, and his tentativeness on the role of theoretical model are suggestive of the need for a more precise solution. Actually, Peacocke's more recent and fuller adoption of the pantheist model only deepens the critical realist dilemma: What good is such a model in theology?

While Peacocke sees theology's function as *fides quarens intellectum*, his account of theological knowledge in terms of a natural model for God leaves the faith in a transcendent God unaccounted for. A general revelation has superimposed itself on the special character of revelation, traditionally understood as God's response to questions of meaning. Indeed, Peacocke's own citation of the questions of meaning for human persons is an indicator that theological knowledge claims go beyond the strict understanding of human rationality that marks the scope of his definition of critical realism and his natural model for God. Peacocke's quest to incorporate revelation and self-transcendence within a theological synthesis or system needs further refinement. This is strikingly true from the vantage point of faith and religious experience. Peacocke does leave clues about the limits of critical realism with respect to theology that arise in the very critical realist portrait of rationality and human knowing itself. I suggest that at this point, John Polkinghorne can stretch both Barbour and Peacocke's understanding of critical realism in light of religious faith. By exploring the work of John Polkinghorne, the pattern of intentionality historically

associated with religious faith can be more fully brought to bear on the natural knowledge that all three thinkers associate with critical realism. Without this challenge emerging from the assent of faith itself, the notion of critical realism assumes a strictly intellectual pattern that falls short of what theology and the Christian tradition claim to be the animating power of faith in human life.

### John Polkinghorne

For Polkinghorne, there are many more elements of theological patterns of thought available to describe a harder distinction between faith and rationality. This section will present Polkinghorne's accent on intelligibility as the goal of inquiry that characterizes his distinctive critical realist framework. In contrast to Barbour and Peacocke, Polkinghorne notes a contrast between the disciplines. The result is interdisciplinary consonance. Polkinghorne holds out much more hope for a theological metaphysic based on the quality of intelligibility. This is exemplified in the search for a causal joint linking Creator and creation. God's creating and saving activity is identifiable, even to the point of being empirically identifiable within natural systems that others designate as entirely independent of God's action. Polkinghorne has become well known for seeing chaotic systems as places where God's agency is at work specially. This is also possible through the anthropic principle. Polkinghorne's search for the causal joint between Creator and creation is driven by the exigency to view the Creed and theological doctrines under the light of faith. As a result of this outlook, Polkinghorne's theologically oriented casting of critical realism is focused on distinctions rather than unity in human rationality. We are therefore invited to expand our understanding of critical realism to highlight specific distinctions as they pertain to the possibility of a longer term integration of the disciplines. The hope is to achieve this in a way that is neither fideistic nor rationalistic, and as we will see, Polkinghorne's efforts will require further developments in order for this to be realized.

John Polkinghorne's Gifford Lectures are found in the volume entitled *The Faith of a Physicist*. As stated already, his work is strikingly different from Peacocke and Barbour's Gifford Lectures. First, there is an explicit appeal in Polkinghorne's work to the distinction between natural and revealed theology. Second, in contrast to Peacocke's attempt to describe revelation as general and to Barbour's guidance of revelation under a philosophical category, Polkinghorne returns to *doctrine* as a distinct theological form of knowledge. Polkinghorne offers an empirical reflection on the Creed. He attempts to articulate the plausible natural or scientific grounds that justify the kind of explanations found in the Creed, and by extension, doctrinal Christian theology. He explicitly sets out to describe the contents of doctrinal theology as the unique hermeneutical context for theology. He is evidently wary of staying with the more general theological notions provided by Barbour and Peacocke.

In taking this significant step, Polkinghorne intimates that doctrinal theology and natural theology should be explicitly differentiated. He underlines this differentiation by departing from the style of earlier work. Earlier writings, and others since *The Faith of a Physicist* was published, conform much more to the style of natural theology. It is essential to refer to these works by Polkinghorne in evaluating his

overall position.<sup>73</sup> In light of his choice to reflect on the Creed in his Gifford Lectures, Polkinghorne lays down a definitive challenge. He chooses to work within the parameters of revealed theology in a prestigious forum dedicated to natural theology. One can imagine the surprise of those who first heard Polkinghorne speak.

Polkinghorne strongly implies that the arguments offered within the natural theology tradition are insufficient by themselves. For Barbour and Peacocke, the natural/revealed theology distinction does not base their theological notions as it does for Polkinghorne. Complicating the issue is the fact that Polkinghorne later labels revealed theology as systematic and natural theology as philosophical theology.<sup>74</sup>

Where does critical realism fit into Polkinghorne's position? While Polkinghorne's position on the issue is not unfamiliar given what Barbour and Peacocke provide in terms of a historical sketch in the philosophy of science, the fact is that measuring Polkinghorne's interpretation is more complex. For Polkinghorne, critical realism is understood in similar terms as it is for Peacocke. But with Polkinghorne, critical realism is the breakthrough that justifies a renewal in theology given a cultural disillusionment with a purely natural account of reality. Critical realism integrates the act of knowing with the known in the affirmation of a unified worldview. Polkinghorne articulates this view metaphysically as a 'dual-aspect monism'. Knower and known are two aspects of a wider unity.

Before turning to Polkinghorne's explicit theological orientation to critical realism, I will survey his understanding of critical realism in science. In a later book entitled *Scientists as Theologians*, Polkinghorne evaluates his contribution alongside Barbour and Peacocke's. In it, Polkinghorne defines critical realism. Quoting Peacocke and Ernan McMullin, he notes:

In practice, working scientists, I would argue, adopt a skeptical and qualified realism, according to which their theories and models are proposed and regarded as 'candidates for reality'.<sup>75</sup>

He goes on, however, to clarify his own interpretation of critical realism in a highly significant passage: 'I have added to my critical realism the suggestion that it is intelligibility that is the key to reality [...]'.<sup>76</sup> But what is this intelligibility that is *not* included in Barbour and Peacocke's definitions of critical realism? One indication comes from an earlier work *Reason and Reality*:

[...] the critical realist believes the way things are will provide the necessary clue to how they are to be understood. Those who commit themselves to this trust in a rational cosmos are asserting intelligibility to be the key to reality.<sup>77</sup>

This affirmation coheres roughly with Barbour's articulation of a correspondence theory of truth, an epistemological verisimilitude in arriving at a fact for ontological categorization. But, Polkinghorne distances himself from naïve realism. Trust in a rational cosmos is not the same thing as a belief in certainty. After quoting from Ernan McMullin's oft-cited article on scientific realism (about which, more in Chapter 2),<sup>78</sup> Polkinghorne comments that rational inquiry is:

not characterized by an unwillingness to take intellectual risks, so that we cling to what is deductively certain, but to [...] venture on the construction of a metaphysical scheme



whose justification will lie in its attainment of comprehensive explanatory power. The success of science should encourage us to take such a bet on the reasonableness of the world and commit ourselves to an openness of experience to being understood.<sup>79</sup>

Rational inquiry is meaningful and leads Polkinghorne to reject a deductive foundationalism in knowledge, while embracing a new kind of foundation expressed in the sheer confidence of reason and the human drive to make sense of our experience. He calls this concern a quest to identify and address the exigencies of 'motivated belief'.<sup>80</sup> Later, Polkinghorne implies this attitude allies with Bernard Lonergan's version of the cosmological argument for the existence of God.<sup>81</sup> He is thus open to metaphysical frameworks as unifying schemes. In this regard, Polkinghorne shows promise in being able to foresee a wider, constructive meaning of critical realism without adopting a specific theoretical commitment in the ways we have seen with Peacocke and Barbour. He sees a purpose in 'rational inquiry'. Also, while he describes the possibility of an explicit metaphysical way of accounting for this, he does not offer a technical explanation for the different elements of intelligibility in relation to rationality.

He cites crucial differences between Barbour, Peacocke and himself on critical realism. Using and understanding models and metaphors are 'undoubtedly influenced by our differing experiences of doing science'.<sup>82</sup> He notes that Barbour and Peacocke endorse the role of models in scientific rationality as significant. They each cite the model as 'symbolic representation', 'imaginative tool' and a 'state of affairs brought into a resemblance with another state of affairs'. Polkinghorne disagrees. Rather, science and theology are different in the way that they employ models. For him, models play a far more fundamental role in theology. Models are much less important in science. What the other two scientist theologians each miss, according to Polkinghorne, is the clear scientific intent to explain in practice. This is the *telos* of the model, and it goes beyond simply understanding and affirming the model's analogical character, which Peacocke emphasizes.<sup>83</sup> Rather, as Polkinghorne notes, the really exciting aspect of scientific practice concerns theory construction.

Another fascinating observation comes in the same chapter of *Scientists as Theologians* where Polkinghorne rejects the role that Barbour and Peacocke give to metaphor in scientific explanations. So far as Polkinghorne is concerned, models are frequently used, while metaphors are rarely used in science, or at least metaphors are used more to communicate and popularize than to distill. When metaphors are used, scientists are using 'picturesque shorthand for ideas that they can readily and more adequately convey in precise scientific language [...]'.<sup>84</sup> The use of metaphors in science should therefore be downplayed. What is at work in Polkinghorne's criticisms of Peacocke and Barbour here?

Polkinghorne contrasts his approach from the other two lecturers on epistemological questions. So the definition of critical realism is definitely at stake. However, the underlying current in his critique seems to be on how truth is claimed. Polkinghorne seems to be searching for a way to sharpen the accent on cosmic intelligibility and the coherence of our rationality in the face of the general quest for unity that Barbour and Peacocke share. He seems to be aware that if the claim for unity is falsely argued, it may be imperilled.

Nevertheless, true to his announced accent on faith in this volume and elsewhere, Polkinghorne turns away from epistemological considerations to focus on theology.

Ultimately, he views the significant differences between the three thinkers to be in terms of *theology*. Polkinghorne articulates this contrast as follows:

I believe that a main source of divergence between myself and Barbour and Peacocke will be found to lie in the degree to which one needs to pursue an assimilative strategy and the degree to which one can press the search for specific areas of consonance [...]. As discussion has moved on from the periphery of contact between science and theology and come close to the heart of the latter's concerns, divergences have begun to appear between us.<sup>85</sup>

In sum, Polkinghorne sees a greater role for theological tradition in defining the way in which critical realism applies within theology. He notes: 'perhaps rather more than my scientist-theologian colleagues, I am anxious to locate our twentieth-century understandings within that development of Christian doctrine [...]'.<sup>86</sup> Yet he is also prepared to shed a major tenet of classical theism: the stress on God's atemporality. He wants to stress God's temporality instead. He makes this move in order to promote the doctrinal weight of christology and the incarnational aspects of God.<sup>87</sup>

Polkinghorne's theological anxiety stretches to include the way he practises interdisciplinary consonance. It is reflected in the way he treats the cosmological anthropic principle, for example. Alongside intelligibility, the anthropic principle is a frequently mentioned topic in science–theology discussions.<sup>88</sup> Polkinghorne is willing to appropriate such scientific theories in order to revise natural theology, even though theories such as the anthropic principle are virtually unverifiable as scientific theories. However, there is considerable ambiguity in Polkinghorne's thought on such issues. For example, Polkinghorne states elsewhere that the key to natural theology is simply:

*insight*, ... a way of looking at the totality of things which has coherence and intelligibility ... not particular circumstances, but to law and circumstance which underlie all physical occurrence.<sup>89</sup>

The claim here is one in which God acts through secondary, natural causes resulting in a belief in an intelligibility that crosses disciplinary and boundaries of physical levels. Intelligibility defies reduction into one particular phenomenon or any metaphysical concept. However, Polkinghorne does not emphasize insight as the human experience of intelligibility. Rather, he emphasizes consonance between the disciplines, based on this metaphysical fact.

How does Polkinghorne's accent on critical realism become metaphysically reflected? He states several times in various ways that 'epistemology models ontology',<sup>90</sup> but what does this really imply? Is there a way he captures the different elements of his critical realist outlook that can account for what this means? Polkinghorne does not deal with such metaphysical descriptions in *The Faith of a Physicist*. However, he elsewhere defends 'dual-aspect monism', following the lead of philosophers of mind such as Thomas Nagel, and as I stated earlier, he takes what he believes to be the indeterministic nature of certain natural systems to suggest the indeterministic nature of human rationality, the always provisional nature of truth.<sup>91</sup>

The theological importance of 'dual-aspect monism' is apparent. It conceptualizes the possibility that God guides creation through both history (mind) and nature (matter). Polkinghorne does not rule out divine action in and through matter as well

as mind, and this is precisely where he attaches significance to the quest for the causal joint. He foresees the distinct possibility of ‘theological talk of the Spirit guiding and leading creation [...] cashed out within the flexibility of physical process’ based on the current evidence for openness in quantum and chaotic systems.<sup>92</sup> In short, there is required an ontological gap that is filled by God. Here, the metaphysical and the theological are joined.

Yet Polkinghorne has much to comment on in terms of theology as a critical realist discipline. In *Reason and Reality*, Polkinghorne describes his theological critical realism as:

based on an analogy with science’s approach to exploring the way things are. Because it is realist, theology will want to retain an evidential appeal to Scripture as ground for belief. Because it is critical realism, theology will seek to respect the nature of the Reality it encounters.<sup>93</sup>

In acknowledging the Kuhnian revolution in the philosophy of science, Polkinghorne indicates, like Barbour, that a theological critical realism is modeled on the scientific version. He goes on in another later text to claim the validity of the interpretive priority of knowledge. He notes that:

Intelligibility requires the adoption of a prior interpretive point of view in the effort to make sense of what is going on. Another reason our realism must be qualified as ‘critical’ lies in this need to don these theoretical spectacles in the attempt to perceive pattern in the flux of events. Neither in science nor in theology will we derive much insight from simply staring at raw data.<sup>94</sup>

The question is what Polkinghorne means by an interpretive point of view. Does he mean a hermetically sealed paradigm, as Thomas Kuhn’s theory of the structure of scientific knowledge? Or does he mean interpretive, in the sense of those theoretical constructs that make sense of the data? It is unclear, although Polkinghorne does disavow scientific historicism. Polkinghorne focuses on the notion of circularity in knowledge. Both hermeneutically and epistemologically, he sees a great deal of evidence for verisimilitude between the known and the knower. But he is lacking an explanatory theory to state why this is the case. This lack of detail on what constitutes the limits of an interpretive viewpoint of knowledge and its potential theological significance is, in my view, critical.

In evaluating Polkinghorne’s stance, one is impressed by the fact that Polkinghorne agrees with Barbour and Peacocke on critical realism.<sup>95</sup> As with Barbour and Peacocke, he claims it is transferable to theology. However, he then approaches theology as a discipline that requires significant modifications to clarify its uniqueness. Why? He argues against what he sees as the deleterious consequences of theological generalization. Such generalization, he points out, can jeopardize the uniqueness of theology.<sup>96</sup> Complicating matters further, Polkinghorne cites a critical realism for understanding the Holy Spirit and the church, for example.<sup>97</sup> The dilemma with this portrait of theological knowledge gives the impression that theology is as empirical as the other disciplines – on critical realist grounds. What is ironic is that Polkinghorne presents theology’s dependence on faith as truly distinctive. The reader is left with conflicting interpretations of Polkinghorne’s position.

It is puzzling why Polkinghorne does not directly utilize the theology of creation more often as one theological prism through which to view the presence of intelligibility. One suspects that this is due to his suspicion of generalization. Creation can be affirmed by deists, and falls under the category of general divine action over which there is no dispute among those active in the science–theology dialogue. But a more detailed account of creation from a systematic theological perspective such as that undertaken by Gerard Siegwalt would be a logical indicator of consonance to express the faith of a physicist. Polkinghorne offers only one chapter on creation in the Gifford Lectures. In contrast, Barbour argues in greater detail for a view or theology of nature, as does Peacocke. But Polkinghorne’s theological realism refers primarily to the historical realization of God’s special action, especially his redemptive action. The divine underwriting of realism is based on God’s consistency: ‘God will not mislead us, either in the revelation of himself, or in the works of his Creation’.<sup>98</sup>

While there is legitimacy to this line of argument, it might be worth asking whether such a leap from the rationality of the cosmos to a confidence in the will of God is best carried out without a more elaborate mediation of revelation. Given the centrality of human rationality in critical realism, is there not an element of rationality that contains such a mediating importance? Perhaps the theological consequence of critical realism is that it is more than structurally transferable. Polkinghorne demonstrates some awareness of the fruitfulness of other theological explorations in analogy and imagination in all aspects of rationality. His citation of Keith Ward’s ‘capacious understanding of rationality’ is a glimpse of this.<sup>99</sup>

The question of the Holy Spirit is an interesting issue that draws Polkinghorne’s theological instincts to the foreground too. In *The Faith of a Physicist*, Polkinghorne treats the Holy Spirit as a way to distinguish his contribution from Barbour’s process position and Peacocke’s pantheism.<sup>100</sup> In holding out for a sharper distinction between Creator and creation, Polkinghorne seizes on a theological issue that supports a careful distinction between revelation and natural theology. He is reluctant to conceive the Holy Spirit as the mere presence and activity of general experience understood theologically. This is the way in which Polkinghorne wants to go beyond Peacocke’s emphasis on top-down causation. For Polkinghorne, this perhaps neglects the role of bottom-up personal decision to participate in the life of God.

While there is no evidence of opposition between systematic and doctrinal theology in his writing, Polkinghorne offers contradictory lines of thinking. As a result of the focus on doctrine, however, *The Faith of a Physicist* lacks methodological reflections on science that characterize Barbour and Peacocke’s lectures.<sup>101</sup> Polkinghorne wants to re-situate theology away from being merely an interpretive framework, one hermeneutic among others. He wants it to be an interpretive framework with its own data of religious experience that exists as a distinct data-theory level in human culture. So, with religious experience of the faith community, Polkinghorne re-introduces ‘bottom-up’ causation within theology. For theology to affirm the top-down causation of divine action, there needs to be a concomitant ‘bottom-up’ theological intention that can positively anticipate divine presence. Here, he deliberately chooses to emphasize a different metaphysical trajectory than Peacocke’s top-down causation. This explains his choice to use the Creed as an interpretive framework with its basis in religious experience, broadly conceived. But Polkinghorne also has in mind the needs of a revived natural theology: ‘If

natural theology is to flourish again, it will require more input from the theological side'.<sup>102</sup>

Metaphysically speaking, without grounding intelligibility in terms broader than insight, Polkinghorne limits the potential appreciation of the meaning of dual-aspect monism. Dual-aspect monism is an assertion that cannot be sustained through attention to the sort of multi-faceted metaphysical elements that Barbour and Peacocke are prepared to describe. Nor is it sustainable in the context of the history of metaphysics, since it is not linked explicitly to a metaphysical tradition as such. This is somewhat ironic, considering Polkinghorne's intention to persuade his readers of the theological implications of cosmic intelligibility. These implications are especially apparent in the indeterminism of chaotic systems in nature, according to Polkinghorne. We must not evade the search for a 'causal joint' between God and nature, between Creator and created. Furthermore, this causal joint may also exist partly through clues afforded by the ontological openness of quantum events. Thus 'God's providential interaction is purely through the top-down input of information.'<sup>103</sup> Polkinghorne wants to reconcile such a general statement of providence with the kind of emphasis on christology and incarnation that becomes the hallmark of his Gifford Lectures. Whether critical realism, as he conceptualizes it, can sustain such a broad array of emphases is questionable. What is needed is a philosophical mediation to express both the complementarity and the nexus of the mental world with the reality of the world in terms of the different questions and disciplines accounted for by critical realism.<sup>104</sup> Asserting critical realism and arguing for critical realism make all the difference between sustaining or muddling such a broad approach.

As it stands, what is the difference between critical realism in science and critical realism in theology? The difference, for Polkinghorne, has to do with the different grounds of experience or evidence: scientific experience is repeatable, religious experience is uniquely known in particular historical episodes. Each version of critical realism is nevertheless similar because both versions testify to a form of motivated belief.

However, Polkinghorne holds that theology is sufficiently distinct in its historical and faith-centred reflection that it cannot be simply tagged at one end of the spectrum of knowledge. Faith disrupts such a systematic account. Polkinghorne's stress on religious and theological uniqueness possesses an epistemic dimension. Theology possesses its own rational grounds for making a knowledge claim:

Metaphor is not intrinsic to scientific discourse, but it certainly is to theological discourse. The latter's need to use finite language about the uncapturable infinity of the divine nature requires the indefinite open-endedness that metaphor affords, its poetic power to grant intuitive illumination.<sup>105</sup>

While this characterization of metaphor might require amending, I believe that Polkinghorne has identified something extremely important. While Barbour and Peacocke have contributed to supporting theology with the ability to make knowledge claims, they may have neglected to demarcate the basic differences between theology and the natural sciences. Polkinghorne's embrace of faith is evidence of his unique emphasis.

Polkinghorne goes further than Peacocke in the sense of explicitly stressing the inevitability of a metaphysical view. He believes that Peacocke is too hesitant when

it comes to acknowledging the presence of metaphysical insights. This point is valid. Peacocke's initial reservations about panentheism may evince a reluctance to develop fully his metaphysical views. Polkinghorne's lack of reserve, on the other hand, is strikingly different. Yet Polkinghorne's dual-aspect monism also seems too descriptive and inadequately defended to account for the complexities of intelligibility and rationality. He sees dual-aspect monism as a 'metaphysic in which mind and matter are complementary aspects of one "world-stuff", perceived in the different phases of the material and the mental'.<sup>106</sup> Yet this remains a descriptive account. It mirrors and elaborates Polkinghorne's frequently made statement that epistemology and ontology model one another. If epistemology does model ontology, we would need an adequate way to affirm the elements of this model in the history of science that testify to a certain growing consensus in an ontological categorical scheme.

In summary, Polkinghorne's depiction of critical realism both coheres with previous usage as well as correcting an over-systematized and structurally focused account of knowledge. There is a legitimacy to Polkinghorne's protests against the conception of science and theology as epistemologically equivalent, although he still advocates their epistemological parallels. However, similar to the question I raised with respect to Peacocke, there still seems to be a lack of relationship between Polkinghorne's definition of critical realism with both the *telos* of human inquiry he emphasizes, and the differentiated knowledge of a transcendent God that he upholds.

## Conclusion

The chief ramification of Polkinghorne's contribution is still the character of human rationality and its relationship to scientific rationality and faith. How are they related? Is it yet possible to carve out a portrait of human rationality starting from the way in which we understand nature that could yield a better understanding on the place of faith and revelation? As Polkinghorne states it, faith is a stance of hope that contrasts with much else in human rationality. The intelligibility of the universe meets a limit that is undefined at the level of meaning in human rationality. In short, this is one of a number of avenues available to draw out the unity that each Gifford Lecturer seeks as a result of their respective insights into critical realism.

One philosopher in particular holds important keys to answering this question on rationality and theological knowledge claims. Ernan McMullin has written extensively on the various dimensions of scientific rationality, the history of science and the issue of realism. At the heart of his contribution is an operative distinction between scientific and critical realism. He combines this insight, among others, with a keen theological sense of meaning. Moreover, he has incorporated science and cosmology into his philosophical reflections on human rationality, including those questions that touch on the question of God. McMullin's writings cover the underlying nature of the dialectic in the philosophy of science, from Ptolemy and Aristotle to the modern realist and non-realist positions with a contemporary understanding of rationality worked out in dialogue with both theology and recent scientific discoveries.

Partly owing to the fact that each of these three Gifford Lecturers relies on Ernan McMullin, the next chapter will develop further McMullin's definition of science and

scientific rationality. His more foundational account is a necessary step to retrieve a philosophical framework in the science–theology dialogue. In short, a more differentiated analysis might help frame a more theologically judicious approach to how the connection between rationality, critical realism and theological reflection is specified. Indeed, McMullin has worked out a theory of scientific rationality that opens up broader possibilities for theological reflection than the rush to metaphysical categories usually implies.

What emerges from this analysis of the three scientist-theologians is a mixed picture of the philosophical and theological scope of critical realism. Their penchant to describe critical realism opens up the further development I am arguing is possible with McMullin. The rejection of critical realism by thinkers such as Willem Drees, and to a lesser extent Wentzel van Huyssteen, may in fact be the rejection of a term that has been insufficiently developed. This is particularly the case with respect to theology. Critical realism has yet to be fully transposed from an explanatory context in the philosophy of science into an interdisciplinary setting suitable for the science–theology dialogue.

What needs to be done is to better account for critical realism. This account would take up the quest for unity in knowledge expressed by each lecturer as in:

- 1 Barbour’s identification of critical realism as key to science–theology rapprochement through the process metaphysic;
- 2 Peacocke’s insight that critical realism implies a hierarchy of levels of nature and disciplines with human reality as a distinct microcosm of the universe into which personal self-transcendence is real and the basis for systematically establishing a God–World relation, and
- 3 Polkinghorne’s judgement that the act of human understanding is the most significant feature of critical realism in a context where human inquiry possesses a *telos* and where a revealed faith in a God who transcends the universe can be apprehended in roughly critical realist terms. For Polkinghorne, we need to move beyond an understanding of critical realism where theological knowledge claims require plausibility through interdisciplinary investigations.

A renewed critical realism would go beyond simply describing the achievement of knowledge as a *via media* between subject/object, nature/history and mind/matter. It would account for the act of knowing as accounted for in terms of the history of rationality itself. It would also go beyond a dialectical metaphysic that sees knowing and known in some kind of opposition. With the thought of Ernan McMullin, this possibility exists, starting from the way in which he analyses how realism has overcome positivism and historicism in science. This continues in McMullin’s deft handling of the distinctive role religious faith plays in the act of self-understanding.

There are two central questions that can be brought to bear on the inadequacies of critical realism discussed thus far. These questions will guide the analysis in the rest of this study:

- 1 Is there an explanatory theory of scientific knowledge that accounts for human rationality and the historical trajectories of science in the fullest possible way while providing a heuristic for an integrated metaphysical worldview?

- 2 What elements of this account of critical realism can reconstruct how theological knowledge claims operate, given the way human rationality understands scientifically, and does this apply to God?

The first question regards critical realism as an insight from the philosophy of science, and it is taken up with regard to three issues: scientific realism, scientific history and cosmology. These three issues are treated in Chapters 2 and 3. The second question concerns to what degree it contributes to theological method. This question is treated in Chapters 4 and 5. Chapter 4 highlights the distinctiveness of the theological inquiry that emerges directly from the portrait of critical realism in Chapters 2 and 3, and takes up Polkinghorne's approach to distinguish faith from rationality. Chapter 5 addresses what becomes integrated in a critical realist worldview in the end, given the differentiations in knowledge and suggestive of the kinds of extensions to Peacocke's thought that arise as a consequence of an explanatory critical realism. As this study will show, imagination and consonance are key conceptual indicators of what conclusions are drawn from developing a critical realist framework.

The next three chapters, Chapter 2 in particular, will deal with material provided in the lifetime work of philosopher Ernan McMullin. As mentioned earlier, Barbour, Peacocke and Polkinghorne each cite Ernan McMullin in their defence of critical realism. McMullin's thought, however, has not been incorporated in greater detail. What follows, therefore, is an analysis germane to both the definition of critical realism itself, and the internal dynamics of McMullin's work as it pertains to critical realism, scientific realism and the genuine character of theology.

## Notes

1. Yet the understanding of God as redeemer of humanity stands as a contrasting approach to this traditional one. The question of redemption is closely associated with questions of evil, sin and the theology of revelation. The focus of the science–theology dialogue is shifting, however, as new studies in neurobiology, psychology and theological anthropology develop in response to the rise of sociobiology. As this develops, it will have to contend with the key methodological issues that have also surfaced.
2. As Polkinghorne summarizes it, these lectures are intended to reflect on the natural knowledge of God 'by those who aspire to be "sincere lovers of and earnest inquirers after truth"'. See John Polkinghorne, *The Faith of a Physicist* (Princeton, NJ: Princeton University Press, 1994), p. 1. A list of recent lecturers treating religion–science issues includes Ian Barbour (1989–90, 1990–91), Arthur Peacocke (1993–94), John Polkinghorne (1994), Stanley Jaki (1974–75, 1975–76), Peter Jones (1995), Mary Midgley (1989–90) and Seyyed Hossein Nasr (1980–81). Other historically notable lectures on the same theme are A.N. Whitehead's 1927–28 lectures published as *Process and Reality: An Essay in Cosmology* (Cambridge: Cambridge University Press, 1929) and Carl Friedrich von Weizsäcker's 1959–60 lectures published as *The Relevance of Science: Creation and Cosmogony* (New York: Harper and Row, 1964). In his introduction to a history of the lectures, Stanley Jaki writes: 'In a world increasingly bogged down in technological pursuits and at a loss to cope with problems – psychological, social, moral, and ideological – they create, no academic organ has kept so alive some higher perspectives as have the lectureships which Lord Gifford decided to establish a hundred years ago'; see Jaki, *Lord Gifford and His Lectures: A Centenary Retrospect* (Edinburgh: Scottish Academic Press, 1986), p. 1. Given the wide scope of the science–theology exchanges, it is fitting that this



prominent series might be a helpful way to build bridges, not only between disciplines, but also between the academy and culture.

3. It is true that Polkinghorne's decision is not absolutely unique in terms of the history of the lectures. Jaki assesses Barth's 1936–37/37–38 lectures as follows: 'In charging both Luther and Calvin with disloyalty to the spirit of Reformation on account of their occasional recourse to natural theology, Barth merely served witness to the reluctance of Christian theologians to cut their moorings from reason, for fear of undercutting their very credibility. Barth was certainly alone among Christian lecturers in inveighing against natural theology'; see Jaki, *Lord Gifford and His Lectures*, p.59. Nevertheless, Polkinghorne's decision does not amount to a disavowal of natural theology in the manner that Barth articulated it, but rather an evaluation of a *strictly* 'natural' theological approach to questions of faith and science from the standpoint of revealed or creedal theology.
4. Such critiques include the following: Nancey Murphy, 'From Critical Realism to a Methodological Approach: Response to Robbins, van Huyssteen and Hefner', *Zygon* 23 (3) (1988), pp. 287–90. See also the contributions in *Rethinking Theology and Science: Six Models for the Dialogue*, ed. Niels Henrik Gregersen and J. Wentzel van Huyssteen (Grand Rapids, MI: Eerdmans, 1998).
5. By a framework, one can follow Yves Congar's judicious theological definition, taken from his appraisal of early patristic systematics: a 'propaedeutic [...] philosophy and the human sciences in relation to the contemplative activity of the believer'; see Congar, *The History of Theology*, trans. by Hunter Guthrie, SJ (Garden City, NY: Doubleday, 1968), p. 41.
6. I am mindful of the historical background that is essential to grappling with theology's identity. In terms of how theology is understood *vis-à-vis* the natural sciences and philosophy, Wolfhart Pannenberg's *Theology and the Philosophy of Science* (London: Dorton, Longman and Todd, 1976) is an excellent overview and insightful diagnosis of the situation. See especially Part One, 'Theology Between the Unity and Multiplicity of the Sciences', and particularly Chapter 1, 'From Positivism to Critical Rationalism', for a summary of the most relevant figures and issues in determining the current status of theology as a discipline. My study here tackles similar material as Pannenberg's work. However, this study deals with the more limited subject of theological knowledge in light of the proposed epistemological position of critical realism. Pannenberg, in contrast, is concerned with wider issues involved in the structure of all scientific disciplines, theology included.
7. See Nancey Murphy, *Theology in the Age of Scientific Reasoning* (Ithaca, NY: Cornell University Press, 1990), p. 198. Murphy's opposition to critical realism can be understood to arise partly due to her assertion that theology can be 'methodologically indistinguishable from the sciences' (p. 198), a claim that goes too far in my view.
8. Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago, IL: University of Chicago Press, 3rd edn, 1978).
9. Ian Barbour, *Myths, Models and Paradigms: The Nature of Scientific and Religious Language* (New York: Harper and Row, 1974), p. 6.
10. Ian Barbour, *Religion and Science: Historical and Contemporary Issues* (New York: Harper San Francisco, 1997). The first edition was published as *Religion in an Age of Science: The Gifford Lectures, Vol. 1, 1989–90* (New York: HarperCollins, 1990). Other lectures tend to be more specifically thematic. For examples, see Stanley Jaki, *The Road of Science and the Ways to God* (Chicago, IL: University of Chicago Press, 1978) and Holmes Rolston, *Genes, Genesis and God: Values and Their Origins in Natural and Human History* (Cambridge: Cambridge University Press, 1999).
11. The Center for Theology and the Natural Sciences has found Barbour's work to be the most popular text in college and university courses on religion and sciences, through an informal survey. This citation is electronically published at: <http://www.ctns.org/>.

12. Ian Barbour, *Religion and Science: Historical and Contemporary Issues* (Harper San Francisco, 1997), Part 2, Chapter 4, pp. 77–105. (I will cite the 1997 version of the published lectures.)
13. Michael Polanyi, *Personal Knowledge* (Chicago, IL: University of Chicago Press, 1958). Cited in Barbour, *Religion and Science*, *passim*.
14. See Barbour, *Religion and Science*, pp. 130–34.
15. Ian Barbour, *Issues in Science and Religion* (Englewood Cliffs, NJ: Prentice Hall, 1966).
16. The first historical section of the book has been added to the second edition of the lectures. This perhaps indicates that Barbour saw a need to place his discussion of methodologies in science and religion in a concrete context.
17. Barbour, *Issues in Science and Religion*, pp. 172–3.
18. Barbour, *Religion and Science*, p. 89.
19. *Ibid.*, p. 110.
20. *Ibid.*, pp. 109–10.
21. Barbour, *Issues in Science and Religion*, p. 168.
22. Barbour, *Religion and Science*, pp. 106–13.
23. *Ibid.*, pp. 115–30.
24. *Ibid.*, p. 117.
25. Barbour, *Issues in Science and Religion*, p. 137.
26. Barbour, *Religion and Science*, p. 130. The reliance on Kuhn's historical interpretation of the philosophy of science is made fairly explicitly, as in the section on paradigms in science and religion specifically (*ibid.*, pp. 122–9 and 51–8).
27. *Ibid.*, p. 120.
28. *Ibid.*, pp. 117, 121–3, 169 and on p. 170, where Barbour nuances his approval more firmly by offering several 'conditions for applying the concept of complementarity'.
29. *Ibid.*, p. 135.
30. *Ibid.*, p. 136.
31. *Ibid.*, pp. 136 and 157.
32. *Ibid.*, pp. 106–13. Cf. Barbour, *Myths, Models and Paradigms*, pp. 34–8, and *Issues in Science and Religion*, pp. 137–74, which is the chapter entitled 'The Methods of Science'. Although this chapter appears mid-way through the book, it follows a historical survey in which no programmatic arguments are advanced.
33. Cf. Barbour's connection of various points of dispute in science–religion discourse in *Religion in an Age of Science*, pp. 152, 185, 218–42 and 260–70. It is significant that Barbour qualifies his adoption of a process framework in the science–religion dialogue in three ways. First, he distinguishes between process thought in general and the system that Whitehead developed (p. 263). Second, he subjects process thought to the possibility of an evaluation according to the criteria of critically realist knowledge in science (pp. 265–7), although this possibility is outlined very briefly. Third, Barbour places process thought into the context of dialectics in theological method, eventually allowing that as a *model*, it offers 'fewer weaknesses' than the models of neo-Thomism, kenoticism, monarchical theology, existentialism, and so on. What he assumes, and what I will take up in Chapter 5, is the idea that models of the God–World relationship speak of *one reality*, similar to the assumptions under which models operate heuristically in science.
34. Barbour, *Religion and Science*, pp. 285–6.
35. *Ibid.*, p. 220. Barbour makes this point in the chapter on astronomy and creation.
36. My thanks to James Pambrun for this insight into Barbour's stress on relationality.
37. Barbour, *Religion and Science*, pp. 331–2.
38. *Ibid.*, pp. 117 and 121.
39. The recent Festschrift dedicated to Barbour contains a number of excellent analyses and critical connections with other thinkers in the field. See Robert John Russell, ed., *Fifty Years in Science and Religion: Ian G. Barbour and His Legacy* (Aldershot: Ashgate, 2004).

40. This is generally what scholars ascribe to Kuhn, though I would hastily add that he apparently rejected the relativism in the philosophy of science that flourished in his wake. See an analysis of the ambiguity in Kuhn's work in Ernan McMullin, 'The rational and the social in the history of science', in J.R. Brown, ed., *Scientific Rationality: The Sociological Turn* (Dordrecht: Reidel, 1984), pp. 127–63, and 'The shaping of scientific rationality', in E. McMullin, ed., *Construction and Constraint: The Shaping of Scientific Rationality* (Notre Dame, IN: University of Notre Dame Press, 1988), pp. 1–47.
41. Barbour, *Religion and Science*, p. 119.
42. See the discussion in Chapter 5 on how this issue forms the crux of a debate between Ernan McMullin and Arthur Peacocke.
43. Barbour, *Religion and Science*, p. 169.
44. As Nancey Murphy has commented on Barbour's work, it is 'encyclopaedic' in style. See Murphy, 'Ian Barbour on Religion and the Methods of Science: An Assessment', *Zygon* 31 (1) (1996), p. 12. She adds: 'Ian tends to canvass a topic thoroughly, treating all of its related aspects and surveying the range of positions on each issue before setting forth his own views'.
45. Arthur Peacocke, *Intimations of Reality: Critical Realism in Science and Religion* (Notre Dame, IN: University of Notre Dame Press, 1984).
46. Arthur Peacocke, *Creation of the World of Science* (Oxford: Clarendon Press, 1979).
47. *Ibid.*, pp. 22–3.
48. *Ibid.*
49. *Ibid.*, p. 44.
50. See Peacocke, *Theology for a Scientific Age* (Minneapolis, MN: Fortress Press, 1993), p. 21, and *God and Science: A Quest for Christian Credibility* (London: SPCK, 1996), p. 5.
51. *Ibid.*, p. 19.
52. Cf. Peacocke, *Theology for a Scientific Age*, p. 12, and *Intimations of Reality*, p. 24. The quote is from McMullin's oft-cited article 'A Case for Scientific Realism', in J. Leplin ed., *Scientific Realism* (Berkeley, CA: University of California Press, 1984), p. 26. Peacocke mentions McMullin's contribution as being 'a formidable case for ... a critical scientific realism ... based on the histories of, for example, geology, cell biology and chemistry ...'; see Peacocke, *God and Science: A Quest for Christian Credibility* (London: SPCK, 1996), p. 5.
53. Cf. Peacocke, *Theology for a Scientific Age*, p. 13.
54. *Ibid.*
55. *Ibid.*, p. 214.
56. *Ibid.*, Chapter 12. These four levels comprise what Peacocke believes are the scientific discovery of the 'natural' basis of human being in the world.
57. *Ibid.*, p. 34.
58. *Ibid.*, p. 39.
59. *Ibid.*, p. 54.
60. *Ibid.*, pp. 53–4.
61. *Ibid.*, p. 54.
62. '[...] this thread of intentionality and purpose which runs through a self-conscious human life becomes increasingly coloured by awareness of the inevitable termination of its continuity in death' (*ibid.*, p. 75).
63. 'What [is] uniquely characteristic of human beings is their ability as "subjects" to treat the content of consciousness as putative "objects", that is, to be self-aware' (*ibid.*, p. 74).
64. *Ibid.*
65. *Ibid.*, p. 89.
66. In a recent publication with Philip Clayton, Peacocke has expanded on the notion of emergence, which has become the subject of closer scrutiny by a number of other thinkers, especially anthropologists and evolutionary theorists of various kinds in dialogue with Peacocke.

67. At a gathering of scientists, philosophers and theologians at the Capstone Conference in Castel Gandolfo, Italy in 2004, Peacocke disagreed with my application of the term 'supernatural' to his style of theology, which I tried to point out, in vain, could logically be inferred from his extended christological reflection. By choosing to reflect on the person of Jesus Christ, albeit in a non-classical theistic vein, Peacocke has signalled the operation of redemption from a source that is ultimately outside space and time.
68. Peacocke, *Theology for a Scientific Age*, pp. 191ff.
69. See Philip Clayton and Arthur Peacocke, eds, *In Whom We Live and Move and Have Our Being: Pantheistic Reflections on God's Presence in a Scientific World* (Grand Rapids, MI: Eerdmans, 2004).
70. *Ibid.*, p. 21.
71. See his discussion of organic, monarchial and aesthetic models of divine creation in *Theology for a Scientific Age*, pp. 166–70. I would note the strong similarities between Peacocke's endeavours made from the vantage point of the natural sciences with one of the most prominent theological projects undertaken by Karl Rahner, namely the suggestion that human freedom is the basis for an anthropology that itself implies transcendence.
72. *Ibid.*, pp. 106–12. I will return to the issue of the anthropic principle in Chapter 3.
73. Christology, in particular, is developed with the classic statements more in mind than any particular anthropological insights derived from scientific research. In this sense, he misses the fuller connection between human existence and God's redemptive work. See Polkinghorne, *The Faith of a Physicist*, Chapters 5, 6 and 7.
74. See John Polkinghorne, *Scientists as Theologians* (London: SPCK, 1996), p. 12.
75. He quotes from Peacocke's *Intimations of Reality*, p. 25.
76. See Polkinghorne, *Scientists as Theologians*, p. 14, *Science and Creation*, p. 32, and *Reason and Reality* (London: Trinity Press International, 1991), p. 11. In *Science and Creation*, Polkinghorne explicitly acknowledges his debt for this view to Bernard Lonergan, on whom he relies for a theory of judgement that underlies his belief in intelligibility.
77. Polkinghorne, *Reason and Reality*, p. 11.
78. See Polkinghorne, 'A Case for Scientific Realism', in Leplin, ed., *Scientific Realism*.
79. Polkinghorne, *Reason and Reality*, p. 11.
80. See Polkinghorne, *Scientists as Theologians*, *passim*.
81. *Ibid.* Cf. Lonergan's *Insight: A Study of Human Understanding* (London: Longmans, Green, 1957), esp. Chapters 19 and 20.
82. Polkinghorne, *Scientists as Theologians*, p. 22.
83. *Ibid.*, p. 19.
84. *Ibid.*, p. 20.
85. *Ibid.*, p. 8.
86. *Ibid.*, p. 17.
87. Polkinghorne, *Belief in God in an Age of Science*, p. 70.
88. Cf. Polkinghorne, *The Faith of a Physicist*, p. 192, and 'A Received Natural Theology', in Jan Fennema and Iain Paul, eds, *Science and Religion: One World-changing Perspectives on Reality* (Dordrecht: Kluwer Academic Publishers, 1990), p. 89. Cf. Polkinghorne, *Reason and Reality*, pp. 76–8.
89. See Polkinghorne, 'A Received Natural Theology', in Fennema and Paul, eds, *Science and Religion*, p. 89.
90. Polkinghorne, *Scientists as Theologians*, p. 14.
91. See Polkinghorne, *Reason and Reality* and *Science and Providence: God's Interaction with the World* (Boston, MA: Shambhala Publications, 1989), *passim*. Polkinghorne's more controversial application of the saying that 'epistemology models ontology' combined with the belief in God's special action in chaotic natural systems can be found in his article 'The Metaphysics of Divine Action', in Robert J. Russell, Nancy Murphy and Arthur Peacocke, eds, *Chaos and Complexity: Scientific Perspectives on Divine Action* (Vatican City: CTNS/Vatican Observatory, 1995).

92. Polkinghorne, *Scientists as Theologians*, p. 37.
93. Polkinghorne, *Reason and Reality*, p. 69.
94. Polkinghorne, *Scientists as Theologians*, p. 15.
95. *Ibid.*, p. 14.
96. Polkinghorne, *The Faith of a Physicist*, p. 4.
97. Other examples include Polkinghorne's use of the term 'bottom-up' thinking in trinitarian theology in *The Faith of a Physicist*, p. 154, and on p. 156, where he says that realism in a theological perspective is 'divinely underwritten'.
98. *Ibid.*, p. 156.
99. *Ibid.*, pp. 40–1: Ward notes that rationality in theology can operate with the 'highest use of philosophical reason in the conceiving and application of a new organizing idea, or a new interpretation of an existing idea, which enables one to build up a new, more comprehensive scheme for understanding the world [...]'. Polkinghorne takes this as sufficient reason for revaluing the older proofs for the existence of God.
100. Polkinghorne, *The Faith of a Physicist*, p. 151.
101. In fact, as one reviewer has commented, there is little content in Polkinghorne's *The Faith of A Physicist* that deals with religion and science; see James F. Moore, 'How Religious Tradition Survives in the World of Science: John Polkinghorne and Norbert Samuelson', *Zygon* 32 (1) (March 1997), pp. 115–24. In *Faith of a Physicist*, science is explicitly mentioned in a short section in Chapter 2 concerning scientific realism, and sporadically elsewhere as a form of knowledge.
102. Polkinghorne, *The Faith of a Physicist*, p. 44.
103. John Polkinghorne, *Belief in God in an Age of Science* (New Haven, CT: Yale University Press, 1998), pp. 71–2.
104. See Polkinghorne, *Science and Creation*, pp. 76–7.
105. *Ibid.*
106. Polkinghorne, *Scientists as Theologians*, p. 29.