



WHITEHEAD'S PROCESS PHILOSOPHY AND SCIENCE AND RELIGION:
THE PROCESS-INTEGRATION MODEL.

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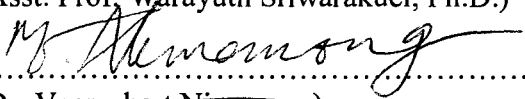
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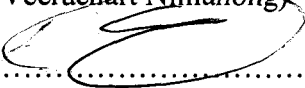

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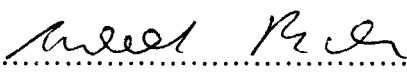
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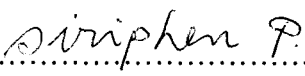

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Abstract

Scientific discoveries and methods have fundamentally altered the way that we conceive ourselves, our world, and the cosmos which encloses us, even as the growth of technology continues to restructure the patterns of our lives, individually, socially, and globally. Meanwhile religion, in spite of often opposing scientific theories which are later found, to religion's embarrassment, to be true, remains a vital and no less fundamental force in human existence at all levels. Religion and science would seem to be locked in an uneasy, ambiguous relationship, in which neither can discard the other, no matter how much advocates of each may attempt to do so.

That both religion and science are deeply intertwined in our actual lives at every level, suggests the urgency of coming to an understanding of the relationship between them. But not only is there controversy between religion and science, there also is controversy over what the relation between them is and should be. The present thesis explores three typical models of that relation: conflict, independence, and dialogue. While each of these express some truth of what the relationship is (or should be), none are adequate. There has indeed been significant conflict between them; but by no means do religion and science always conflict, and indeed scientists and

religious persons are often the same persons. Religion and science do have a degree of independence in their fundamentally different concerns, roughly, meaning and fact respectively; yet those different concerns intersect at essential points, the meaning of life, for example, may not be fully independent of the origins of life. Finally while there is and should be dialogue between science and religion, this model, like the others, treats them as distinct self-contained social institutions that only secondarily have a relation. Their long history of mutual involvement including much more than conflict, independence, and dialogue, and the fundamental urgency of their concerns, suggests a depth of relationship that these models fail to capture.

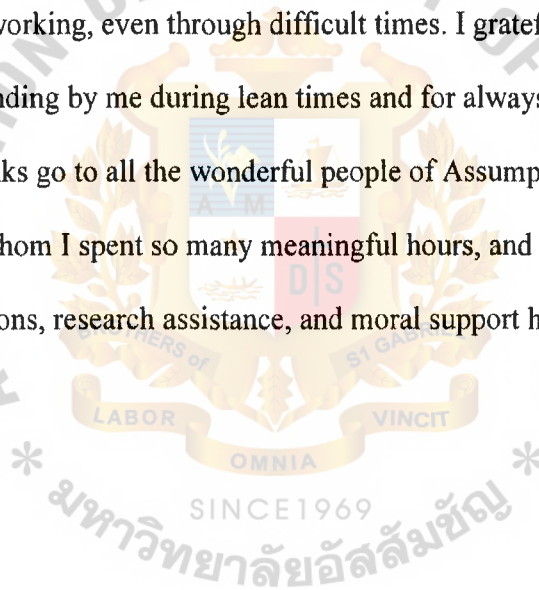
As A. N. Whitehead insisted, an understanding of the relation between religion and science requires an understanding of each. But since their concerns and activities run through every aspect of our lives, and indeed of existence itself, understanding them and their relationship may require a deeper, more inclusive understanding of existence. Whitehead developed such an understanding, known as Process Philosophy, in which the cosmos is understood as a process of processes. Each individual thing, including God, is a process, termed an “actual entity”, which, in turn is composed of actual entities (i.e. distinct processes) and participates in “larger” actual entities. Using this conceptual framework, science and religion are here interpreted as actual entities, processes of comprehension and response to the fundamental and ultimate realities of the cosmos. Science is interpreted here as the act of research aimed at uncovering the fundamental laws of the cosmos. Religion is interpreted as the act of worship, the response to the vision of the whole and the possibility of a harmony of the whole. But natural law and the possibility of harmony are both integral to what Whitehead calls the primordial nature of God. Religion responds to that nature, aiming for the world which it implies as possibility. Science

examines that nature and describes its structure, revealing possibilities and instrumental means of achieving the possibilities. Seen in this way, science and religion appear as elements in the same human project, of bringing the primordial nature of God, the inherent possibilities of existence, to fruition. The difference between them is the social-historical expression of their different roles within that project leading them to elaborate different aspects, structure and possibility, of the primordial nature of God. Contemporary relations of conflict, independence, and dialog are then seen as ways in which they are moving towards a higher level of integration whose precise form we cannot yet know.



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Chapter I

Introduction

Holy Scripture and nature both equally derive from the divine Word [...] in order to adapt itself to the understanding of all people, it was appropriate for the Scripture to say many things which are different from absolute truth [...] on the other hand, nature is inexorable and immutable [...] she never transgresses the terms of the laws imposed on her; therefore, whatever sensory experience places before our eyes or necessary demonstrations prove to us concerning natural effects should not in any way be called into question on account of scriptural passages. [...] Indeed, because of the aim of adapting itself to the capacity of unrefined and undisciplined peoples, the Scripture has not abstained from somewhat concealing its most basic dogmas [...] [If when] speaking even incidentally of the earth of the sun or other creatures, it abandoned this aim and chose to restrict itself rigorously within the limited and narrow meanings of the words [to the] naked and unadorned truth, [Holy Scripture] would more likely harm its primary intention and make people more resistant to persuasion about the articles pertaining to salvation.

* Galileo Galilei, December 21, 1613 (Gebler, 1879)

Thus Galileo wrote to his student, Benedetto Castelli, arguing for the independence of scientific investigation from Holy Writ. At issue, of course, was whether the earth or the sun was at the center of the solar system. He seems to argue that while science pursues the truth about matters of material fact, scripture, and by extension, religion, is concerned with the meaning and destiny of human existence: “salvation.” In order effectively to convey that deeper truth, scripture may sometimes disregard the material facts of the world. The essential truths of religion, in other

words, belong to a different domain from that which science investigates, and contradictions between them are therefore only superficial.

Cogent as Galileo's position was, he was twenty years later condemned by the Holy Inquisition, forced to recant his opinion that the sun was at the center, and confined for the rest of his life to house arrest.

The Galileo affair has come to epitomize the often strained relations between Science and Religion—not least because the affair continues to be a matter of debate. In 1992 a report on the Galileo trial requested by Pope John Paul II vindicated Galileo in words that mirror Galileo's own: Galileo's judges had “failed to grasp the profound non-literal meaning of the Scriptures when they describe the physical structure of the universe. This led them unduly to transpose a question of factual observation into the realm of faith” (Lockwood, 2000). The Church indeed would appear to have adopted Galileo's position wholeheartedly. The official position of the Roman Catholic Church, according to George Sim Johnston, writing on Catholic.net, is that “Scripture does not teach science, period.” Johnston was commenting on Pope John Paul II's much publicized 1996 remark that the theory of evolution is “more than a hypothesis” (John Paul, 1996). The remark was significant in that the current flash point for conflict between religion and science is the theory of evolution. Even if the Roman Catholic Church is comfortable with the theory, many Protestant sects are virulently opposed to it. This is especially the case in the United States of America where Christian conservatives have been engaged in legal efforts to force public schools either to forego teaching evolution or to teach some form of divine creation in addition to evolution. Since by law, religion cannot be taught in public schools in the United States, they have attempted to put their beliefs in divine creation into scientific form. The first effort, “creation science” failed, as the courts ruled that creation

science was religion not science. Presently, they are advocating a more subtle form, “intelligent design” that maintains that the complexity of life on earth scientifically implies an intelligent designer (that is: God). Scientists and civil libertarians have so far blocked those efforts, on grounds that “intelligent design”, too, is not scientific.

Into the controversy, and shortly after the death of Pope John Paul II, Cardinal Christof Schonborn of Vienna published an editorial in the New York Times (July 7, 2005) maintaining that evolution without intelligent design was contrary to the Catholic faith. Father George Coyne, director of the Vatican Observatory, subsequently and pointedly criticized intelligent design as unscientific, and Cardinal Paul Poupard of France, a central figure in Galileo’s vindication, publicly maintained that Catholics should respect the evidence for evolution (*Catholic World News*, 2005).

The disagreement among Christian sects and within the Catholic Church, as well as the continuing battles over the teaching of evolution in public schools indicates that nearly four hundred years after Galileo’s letter to Castelli, there is no consensus even within religion itself as to how science relates to religion. There is a lack of consensus among scientists as well. Many scientists are believers. Father Coyne, for example, is a scientist who sees in the absence of God from scientific theory, confirmation of the freedom that divine creation confers upon the world. Other scientists, such as Richard Dawkins and E. O. Wilson, have mounted well-publicized assaults on religion.

It is evident that the logical relationship between science and religion is not yet understood: beyond the social and political conflicts, is the question whether those conflicts are necessary. Is there something within religion *as such* that contradicts something within science *as such*? It is undeniable that there are differences between science and religion, but precisely what are those differences? Can they be mediated?

If so, how? If the differences are irreconcilable, how might religion and science best relate themselves to each other socially and politically?

Nearly four hundred years of debate and litigation, with profound impact on state policy, not to mention on the future of faith and knowledge, suggest that it is important to attempt to answer these questions. There is every reason to suppose that, as non-European societies adapt more and more to a scientific paradigm, they will suffer conflicts of no less intensity and import than those of Europe and America.

It is my purpose in this work, to explore the existing and possible relations between science and religion, and to propose pathways towards greater integration of these two realms of human activity. I adopt Whitehead's process philosophy to construct and propose an integration in terms of harmony and responsibility, rather than of material well-being. I argue that science and religion are integral parts of the same long-term human project and that present conflicts, as well as their evident differences and complementarities are a part of the way in which they perform their respective functions in that project and through which they may be moving towards a closer integration.

1.1 The Pursuit of Knowledge as a History

The history of humanity is also the history of the pursuit of knowledge. We have always attempted to understand the world around us. We come to feel that we are not alone in the cosmos. We are continually intrigued and challenged by our various situations and confronted by unexpected events that are shot through with mystery: what is the meaning or cause of natural disasters? What is the nature of living things? What distinguishes living things from non-living things? The answers to these questions and the understanding of reality has varied greatly with time and

place; the body of knowledge possessed by any society at any given moment in its history appears to be accommodated to and functional within that particular society at that particular moment. In other words, knowledge may never be wholly objective. It may rather be that knowledge is true in and for a certain social-historical constellation (but possibly not true in and for others) and that knowledge, in turn helps to maintain that social-historical constellation. Changes in understanding have often been associated with crises. For example, Galileo's condemnation, it may be argued, was part and parcel of a larger crisis. European civilization was changing rapidly. The Catholic Church was the center of civilization and Europe was the center of the world, and the world, the earth, was the center of the universe. Through the rise of Protestantism Catholic Christianity was faced with the possibility that it was just one religion among many. With the encounter with non-European civilizations, European civilization faced with the possibility that it was just one among many. The heliocentric universe threatened the old order, yet was more appropriate to the emerging order: the earth, like Catholicism and Europe, was just one planet among many.

To the extent that the understanding of reality is appropriate to the social-historical moment, it is reasonable to ask: in what way should reality be understood in the present? The conflict between advocates of science and advocates of religion may be cogently understood as a battle over that very question.

Ultimately the heliocentric theory won out: no one now imagines that the earth is at the center of the universe. But religion as a repository of knowledge has not been not replaced by science; rather the two have continued to develop side-by-side. Their relations are often conflictual. William P. Alston states:

Some have attacked scientific theories for being inconsistent with religious doctrine; some have attacked religion for being out of step with the advance of science; and some have tried to reconcile in one way or another the warring parties. This debate does not take such a noise in the world today as it did. [...] But the discussion continues, and will continue so long as both science and religion continue to develop and so long as our philosophical understanding of the nature of each continues to grow. (Alston, 1963, p. 493)

That was in 1963. That the volume of the debate has substantially increased in recent years, only confirms Alston's point: a full reconciliation may not be possible. On the other hand, their very difference opens the possibility of dialogue. Many kinds of activity art, religion, science, and so on can and do co-exist. Their long-term co-existence in the same society suggests, however different they may seem, that they are already integrated with each other to some extent. We might expect, then, an overlap between science and religion such that understanding either one requires some understanding of the other and of the relations between them.

1.2 Science and Religion: The Players

Addressing the problem of the relationship between science and religion, Alfred North Whitehead writes:

The difficulty in approaching the question of the relations between Religion and Science is that its elucidation requires that we have in our minds some clear idea of what we mean by either

of the terms, “religion” and “science.” Also I wish to speak in the most general way possible, and to keep in the background any comparison of particular creeds, scientific or religious. We have got to understand the type of connection which exists between the two spheres, and then to draw some definite conclusions respecting the existing situation which at present confronts the world. (Whitehead, 1967, p. 181)

I shall be less ambitious than Whitehead. The problems of defining religion in a completely general way are prohibitive. Most of the discussion in the field, moreover, assumes a Christian, or, at least, monotheistic, religion. I therefore take Christianity as my model of religion, though I hope that my findings will, *mutatis mutandis*, be generalizable to other religions as well.

1.2.1 Religion.

The difficulties in defining religion are not eliminated by focusing only on Christianity. Besides the fact that there are many competing established, or “mainline” sects of Christianity, there has been in the last ten or twenty years a virtual explosion of new ways of defining and practicing Christianity, many of which would probably not be considered Christianity by the mainline churches. The characterization offered here, would have been fully valid mid-twentieth century, at least for Western, that is, Roman Catholic and Protestant, Christianity. While I believe the characterization to remain largely valid, it is offered with the caveat that Christianity is in such a state of change, even turmoil, that a single, fully valid characterization is not possible.

As exemplified by Christianity, religion is characterized by creed, myth, morality, and rite, although many Protestant sects would deny the place of rites. Essential components of a creed that would be acceptable to virtually all sects include:

- There is one God, who is personal, and who created the cosmos and everything in it out of nothing. God is accessible through prayer.
- Humanity is alienated from God. Every individual is already alienated from God at birth and is incapable of reconciling with God by his own efforts. Only God can effect that reconciliation: through the gift of Grace. Without God's Grace, in other words, every individual is doomed at birth to eternal alienation from God, the ultimate tragedy.
- Christ, the Son of God, became a human person, Jesus, at a specific moment in history, and especially through his execution by the Romans, understood as an expiatory sacrifice, brought about reconciliation between God and humanity.
- The individual accesses God's Grace and overcomes his personal alienation from God through believing the creed, in particular through faith in Jesus Christ.

Different sects would state the items differently. My "alienation" is typically called "damnation". Overcoming alienation from God is "salvation". Different sects might add items, but virtually all accept a common core (See Appendix, Creeds). But an essential feature is that the creed is not only what the religion teaches to be true, but also that the individual is required to believe it, both to be considered a member of the community and for her own salvation. Creed is supplemented and elaborated by doctrine, a body of statements taken as true by the religion, yet whose belief is not necessarily enforced. Indeed much doctrine may not be understandable by most

members of the community. Disbelief in doctrine, on the other hand, is typically forbidden.

The creed is (perhaps loosely) derived from the myths contained in the Bible, stories, among many others, of the creation of the world, the “fall” (the alienation of humanity from God through disobedience), the incarnation, life, execution, and resurrection of Jesus Christ. These stories constitute the foundational myths of the Christian community. To what extent the myths should be taken as literally true varies widely among different sects.

Virtually all Christian sects enforce a strict moral code derived (perhaps loosely) from the myths of the Bible. There are differences among the sects. For example, some do and some do not forbid intoxicating beverages, and there is debate on the morality or immorality of abortion and homosexuality.

Many sects, notably Roman Catholicism, emphasize the importance of rites, called “sacraments”, for channeling God’s grace to the faithful. Holy communion and baptism are nearly universal rites, though some Protestant sects would maintain that they are only symbolic and are unnecessary for receiving the grace of God.

I want to emphasize here the decisive importance of faith or belief. It is never sufficient to follow the moral code. Rather through faith, the grace of God transforms the believer’s life, enabling her to follow the code.

Religion, I should say, is a social institution, an activity, in which through creed, myth, moral code, and rite, individuals and communities are oriented in a certain mode of being in and towards existence. Religion is concerned first and foremost with human existence: how to live, why to live, for and towards what to live, not as statements in answer to questions, not as a body of knowledge, but as actual living. But in saying that religion orients people towards existence, I mean to include

towards transcendence. It is a social institution, thus imminent, that participates in transcendence.

1.2.2 Science.

By science I mean the modern empirical sciences, such as physics, chemistry, and biology. It is concerned first and foremost with understanding the world, and if it has an article of faith it is the faith that the world is rational and describable. Although the public conflicts between science and religion concern conflicts between theory and doctrine, science cannot be considered only as a collection of theories. Science is better understood as a constellation of methods for arriving at increasingly more accurate understandings, or descriptions, of the world. There is not full agreement on just what those methods are, but for our purposes, a brief discussion, leaning heavily on Roger Newton's *The Truth of Science* should suffice.

Scientific knowledge consists of theories and laws that 1) are logically coherent with each other 2) which explain or describe objectively known phenomena and 3) and which empower prediction of objective phenomena (Newton, 1997, pp. 49-50). For example, the theory of universal gravitation allows us to predict the motions of the planets, the path of comets, or the trajectory of a rocket (Newton, 1997, p. 108).

Scientific theories are empirically testable: there are objective, measurable ways of verifying *and of falsifying* them (Newton, 1997, pp. 110ff). Predictions are made from the theory, if those predictions obtain, then the likelihood that the theory is correct increases. But for a theory to qualify as scientific there must determinate ways of *disproving* it. The famous philosopher of science, Karl Popper, indeed, insisted that all testing is attempts at falsification. A scientist proposes a theory; he and other scientists then attempt to disprove it. The more such attempts fail to disprove the

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theory, the greater its acceptance. Popper may have gone too far, but as Newton writes, “there is no scientific proof; there is only disproof” (Newton, 1997, p. 112). It is because the theories of “creation science” are not falsifiable that United States courts have ruled that they are not scientific.

This brings up another feature of scientific knowledge: it is never certain. Knowledge depends on empirical validation and refutation, but we can never measure all possible occurrences, our measurements are never perfect and it is always possible that new measurements will force changes in established theories. This is indeed what happened in the first half of the twentieth century. Newton’s laws were shown to be incomplete and approximate, leading to a sea change in the entire edifice of physics, what Thomas Kuhn called a “paradigm shift”. The tentative nature of theories is a central feature of science.

That an event is objective means that it can be observed by any number of people and that they will report the same measurements. The event, in turn, must be repeatable: The same conditions at any other time will yield the same measurements (Newton, 1997, pp. 215, 85).

The domain of science is precisely the universe of phenomena which answer to its methods: public, repeatable, empirical, and rational (Newton, 1997, p. 85). Subjective, strictly private experiences, unless and until there are means of publicly observing them or their effects, are not in the scientific domain. To the extent that religious entities such as deities and souls are not publicly and reliably observable, they are not in the universe of science, though that in no way entails that they do not exist.

But there is an element of the scientific process that does not fit into neat descriptions of method. Scientists collect and analyze data, they propose theories to

“explain” the data, then design experiments/observations to attempt to verify/falsify those theories. How do they arrive at the theories? They are not simply “read off” the data. How do they decide which data to collect in the first place? How do they design experiments? Each of these steps indeed involves acts of creativity, intuition, inspiration very much like those involved in works of art—or in certain religious moments (see, e.g. Barbour, 1997, 96, 106-136). Part of the difference between science and art is succinctly expressed by Noble Prize winning biologist Christiane Nusslein-Volhard in a New York Times interview (July 4, 2006):

It is certainly a creative act to understand phenomena in nature. But after some time, scientific discoveries no longer depend on the personality of the scientist. Whoever discovered the double helix, it is true. It doesn't matter whether Watson and Crick discovered it, or Rosalind Franklin. Yet, no matter how much time passes, Mozart is still Mozart. (Washington, 2006)

1.2.3 *Interplay.*

There is interplay between religion and science. As Galileo suggested, scientific discoveries that conflict with doctrine may force theologians to deeper, and truer understandings of doctrine. The faith that the physical universe is rational, so fundamental to the scientific project, may in turn have been derived in part from belief in a divine, rational creator. Certainly, religion has been a force in overseeing the ethics of scientific research, notably at present in the ethics of stem-cell research.

Again, however the interplay is often contentious, there is no consensus as to the logical relation between science and religion, and certainly no stable rapprochement between advocates of science and of religion. Yet as scientific

knowledge grows apace, and as that knowledge along with scientific perspectives, penetrates and transforms more and more of the world's societies, understanding and rapprochement grows ever more important.

1.3 *Structure of the thesis.*

How and what do we understand by religion and science? How and what do we understand of events about us? The objectives of this research are to explore how religion and science are or can be integrated and how the relation between them impacts our cultural understanding of reality. These questions are explored from integrated historical and philosophical perspectives.

I turn to the process philosophy of Whitehead for the framework of a possible integration of science and religion, seeking an understanding of the harmony among things, events, occasions, and activities.

According to Barbour (1993, 6), the relation between science and religion may be classified and discussed in terms of four broad models: conflict, independence, dialogue, and integration. The first three of these are important and it will be informative to explore them, they are, however, insufficient to the task. In the present work, I further develop the forth model. As the thesis title suggests, science and religion can be integrated in a comprehensive metaphysics based on Whitehead's process philosophy. An integration model along these lines will, I believe, overcome many of the problems facing the other models.

The study is divided into three main chapters plus a conclusion.

Chapter II, "Three Models of the Relation between Religion and Science", is an exposition of the conflict, independence, and dialogue models. In the process, the limitations and problems of each model will become clear.

Chapter III, “Whitehead’s Process Philosophy and the Integration of Religion and Science” explores the concepts and features of Whitehead’s process philosophy. Especially, important to our task is Whitehead’s concept of “actual entity” as composed of both a conceptual and a physical pole. Whitehead’s views of religion, science, and their integration are explored. Whitehead’s main concepts inspire a search for the integration of religion and science. Whitehead views reality as event, occasion, and experience. The process-integration model emerges from attempts to view religion and science as components of an integrated human activity.

Chapter IV, “Defense of the Process-integration Model of Religion and Science” presents a defense of the model developed in Chapter III, justifying this model as including and going beyond the other models, and as suggesting paths to greater integration.

The final chapter discusses implications of the process-integration model for the conduct and future of science and religion. While acknowledging the limitations of the present study the chapter suggests that the type of process analysis used here could be applied to other fields and contribute to a new perspective that affirms the interdependence of all things.

Chapter II

Models of the Relation Between Religion and Science

This chapter discusses three models of the relationship between religion and science: conflict, independence, and dialogue. My starting point is Barbour's classification of the ways in which the relation between religion and science are approached in public and scholarly discourse. While Barbour tends to focus on the evolution-creation controversy, I attempt to push the investigation more deeply into the question of the relation between science and religion as such. Barbour included a forth classification, integration, to which my own position belongs. Integration accordingly will be discussed and developed in subsequent chapters.

2.1 *The Conflict Model*

It is undeniable that there is continuing social and political conflict between the advocates of science and the advocates of religion. In the conflict model, as I see it, that conflict is necessary, science *as such* and religion *as such* contradict each other: their conflicts are ultimately irresolvable. In This model: (1) Religion and science are distinct entities which nevertheless share a common area of concern: their domains overlap; and (2) within that domain they make absolute and mutually exclusive claims. Two representative groups of thinkers who conform to this model are metaphysical materialists on the one hand, and Biblical literalists on the other.

Biblical literalists hold not only that we acquire morality, meaning, and value from scripture, but also that every word of the Bible is true *in every sense*. Few today would agree with the late medieval sentiment that, “The Bible contained all the science that human beings needed. If it wasn’t in the Bible, then God didn’t intend for us to know it” (Price, 2000, p. 137). Neither would many agree that, “The Christians know through revelation [scripture] all that they need to know; beyond that it would be better to remain ignorant rather than to risk falling into the evil clutches of philosophy and heresy” (Miller, 1972, p. 120). But many do insist that *if* something is in the Bible then *that* is true. To the Biblical literalists, we should add creedal literalists. Many Roman Catholics, including, probably Cardinal Schonborn (see Chapter I), do not take the Bible literally, but do take doctrine and creed so nearly literally that, for them, they are irreconcilable with certain scientific theories. I refer to both simply as “literalists”

Metaphysical materialists, hold that matter, that is, mass and energy, constitutes the entire cosmos. “The fundamental reality is matter. We can distinguish a more hard-boiled approach to materialism which denies that anything exists other than material things, and a more soft-boiled approach which admits the existence of non-material things, but insists that they are completely dependent on matter for their existence” (Alston, 1963, p. 497). Truth accordingly is to be acquired only through the examination of matter. Said differently, the domain of science as described in the previous chapter, constitutes, for the materialist, the whole of existence.

Ian Barbour writes:

Scientific materialism is at the opposite end of the theological spectrum from biblical literalism. But they share several characteristics [...] Both believe that there are serious conflicts

between contemporary science and classical religious beliefs.

Both seek knowledge with a sure foundation, that of logic and

sense data, in the one case, that of infallible scripture, in the

other. They both claim that science and theology make rival

literal statements about the same domain, the history of nature,

so that one must choose between them. (Barbour, 1993, p. 6)

Given the incompatibility of the claims of science and religion, materialists and literalists agree that, “a person cannot believe in both evolution and God. Each side gains adherents partly by its opposition to the other, and both use the rhetoric of warfare” (Barbour, 2000, p. 11).

This does not yet mean that literalists on the one hand and materialists on the other would agree that there is a *necessary* conflict between science and religion. If science and religion make inconsistent claims about the same domain, the conflict would be resolved if each vacated the other’s domain. The conflict over evolution would be resolved if science desisted from making claims about the origins of life. Indeed, Christians opposed to the theory of evolution, attack it not by attacking science *per se*, but by attacking the particular theory as *unscientific*, thus implicitly recognizing the legitimacy and validity of the scientific project.

Materialists, meanwhile, may not necessarily object to religion playing a functional role in society, so long as religion desisted from forcing its creeds upon the public as though they were in every sense, including the scientific sense, true. That, as Galileo discovered, amounts limiting the scientific project.

Thus far, in other words, the conflict is only over particular theories that call into question particular doctrines.

Holtzman argues that the conflict is more fundamental: “even if our scientific and religious beliefs and concepts are superficial conflicts, they can be, and are in conflict on the categorical level [...] time [...] existence [...] possibility [...] self, world, and reality. Those who deny any conflict are not attending to the categorical level of science and of religion” (Holtzman, 2003, pp. 77, 81).

Most obviously, materialists simply do not believe in a spiritual order, and invoke science as supporting that belief. Yet, “The key notion of most religions is the idea of a God, an all-powerful, benevolent, and providential being who created the universe and all therein” (Pojman, 1998, p. ix).

It seems to me, however, that such disagreements, no matter how categorical, are insufficient to characterize a necessary conflict. Why could they not agree to disagree—or simply to ignore each other?

We may approach an understanding of the depth of the conflict by thinking about the area of overlap in domains that each would have the other vacate.

Advocates of the scientific project, at least in its early days, often assumed that scientific theory would eventually explain everything, thus reducing the spiritual to the material. While the modern materialist may not be so naive as to expect that such thoroughgoing explanations are forthcoming, he would maintain that they are possible in principle: the domain of science is the whole of existence and nothing must be denied the sharp eye of its inquiry. Nearly all scientists, I suspect, whether or not they are materialists, would agree that nothing should be off limits to free inquiry.

Interestingly, with nothing off limits, scientists have turned their gaze on religion itself, attempting to explain it as a natural phenomenon, hence robbing it of its claims to participation in transcendence.

Sigmund Freud viewed religion as a form of wish fulfillment and a mental defense against the threatening aspect of nature manifest in floods, earthquakes, inevitable death.

Freud sees religion as a form of wish-fulfillment; for him, the dogmas of religion are illusions, derived from deep, persistent wishes. Religion is not, therefore, something *sui generis* but an aspect of our psychological life. In terms of his science of psychology, Freud finds laws that connect one of the natural conditions of our life, namely, insecurity, with the characteristic phenomena of religion. (Richards, 1997, p. 58)

According to Karl Marx, “religion is indeed man’s self-consciousness and self-awareness so long as he has not found himself or has lost himself again” (Marx, 1997, p. 69). Emile Durkheim maintains that while people need religion, it is a purely social, and socially functional, phenomenon (Durkheim, 1997, pp. 72-80).

Religions universally maintain a two-worlds view, of a world of the sacred and a world of the profane. Religion purportedly transports people from the profane to the sacred world. Of course, this is metaphysical nonsense to Durkheim; there is only one world, the natural world, the world that science studies. To understand religion, we must understand how the notion that there is a sacred world ever came into being. Durkheim claims that it is a social phenomenon and tries to isolate the social conditions that make it possible for men to have experiences in which they project an ideal world beyond the mundane, natural

one. "The formation of the ideal world is therefore not an irreducible fact which escapes science; it depends upon conditions which observation can touch; it is a natural product of social life." So, once again, religion is not religion, it is a manifestation of man's social existence. (Durkheim, 1997, p. 58)

To date no scientific theory of religion reducing religion to no more than a natural phenomenon has fully weathered the storms of verification and falsification. Nevertheless the sociology of religion is a thriving field, growing largely out of the work of Durkheim (and Weber) in which religion has been shown to be a social and sociologically describable phenomenon. The significance of this theorizing and this research, however, is that scientific investigation of religion may be *in itself* an act of disbelief.

Galileo wrote that scientific investigation, "should not in any way be called into question on account of scriptural passages," and that such freedom could not encroach on religious truth. Yet if scientific investigation seeks to reduce religion itself to a natural phenomenon, then the transcendent dimension of religion is denied and, surely, all religious truth comes into question. The Church was wrong about the relative motions of the earth and the sun, but it was quite correct that unrestricted free inquiry of the sort engaged in by Galileo would come to challenge the foundations of faith.

The liberal, some would say radical, Roman Catholic theologian, Hans Kung, in the context of arguing that science and religion are complementary and that a complete representation of reality requires the sciences, writes that "theology has nothing against [the methods of] the natural sciences, as long the latter do not attempt

without more ado to extend their methods [...] to man's mind" (Kung, 1993, p 57).

Yet science by its very nature will not and cannot restrict its field of inquiry: in the end it claims as its domain any and everything that can in any way be observed. From a scientific perspective, every statement no matter how exalted is, if it is to be taken seriously, subject to falsification. "There is one God, maker of heaven and earth": from the scientific point of view, that statement is, *at best*, tentative, perhaps taken *as if* true, yet with the possibility that it will be proven false. For religion, the belief itself is what matters, and salvation demands unconditional belief, not tentative acceptance. But if science cannot agree to vacate religion's domain, neither can religion abandon that which the materialists would reserve for science. Materialism denies the supernatural by definition, and while it may smile indulgently at naive religious belief, it demands that the supernatural be kept out of public life. This the literalists cannot do. Belief in the transcendent is salvific. Denial of the transcendent is damning. The transcendent must therefore be proclaimed as forcefully as possible, and denials of the transcendent refuted, for the sake of the salvation of the world. The stakes are ultimate, and inasmuch as the divine interpenetrates all existence, religion, no less than science claims all existence as its domain. Said differently, religion not only believes in the transcendent, but also participates in it (for example through the sacraments), bringing the transcendent into the material world. Religion is a site of interpenetration of the transcendent with the imminent. In the eyes of a literalist, for religion to relinquish claims about material world (as well as claims of the transcendent) would be for it relinquish its own existence.

To sum up, religion and science would seem, in this model, to be in necessary conflict. Not only do doctrine and scientific theory make contradictory claims in the same domain, but also the nature of each is such that withdrawal from contested

domains is impossible. Each claims all: religion has no room for science and science has no room for religion. To paraphrase an old cowboy movie cliché, each might say to the other: “This cosmos ain’t big enough for the both of us.”

2.2 *The Independence Model*

In this model, not only are religion and science distinct entities, but also their domains of concern are wholly distinct. Essentially, therefore, on the logical level, there can be neither conflict nor cooperation between them. Actual social and political conflicts are, accordingly, the result of misunderstanding: when science and religion appear to be making statements about the same domain (for example, the origins of life) they, in fact, mean wholly different things.

Each has its own distinctive domain and its characteristic method that can be justified on its own terms. Each must tend to its own business and not meddle in the affairs of the other. Each field of inquiry is selective and has its limitations. (Barbour, 1993, p. 12)

As activities in separate domains, religion and science take distinct standpoints and employ distinct languages. Science takes an objective standpoint: it attends only to what is public and repeatable, and employs the language of logic and mathematics. Religion, on the other hand, attends to what is personal and unique, employing the language of feeling, meaning, and myth. The human sciences, for example, are concerned to describe and understand the structures of humanity, whether of the individual or of society, in *general*. Science, *as such*, is concerned with any particular

individual only as an instance of the general case, as a source of data.¹ Religion, conversely, is concerned with the particular person, the particular community. The individual, for religion, is a unique person whose life choices and whose fate or destiny have ultimate significance.² The disjunction between science and religion is expressed in several ways: science, it is often said, deals in quantity, religion in quality; science asks: “How?”, religion answers the question: “Why?” science deals with matters of fact, religion with questions of meaning.

According to Schliermacher, science explains the world through reduction, breaking the natural world down into a limited number of basic components ruled by a limited number of natural laws. “Reductionists think of the most complex system as made out of the atomic and subatomic equivalents of springs, cogs, and levers” (Briggs & Peat, 1989, pp. 21-22). Such a universe might be conceived to function quite well, and the mechanistic view has been extraordinarily powerful in describing and explaining and predicting. This, of course, is the universe as science sees it, and such a universe has no room for *meaning*: the religious/moral concepts of freedom, fall, redemption, destiny, and the like do not apply to machines, indeed have no place in the understanding of machines. Neither, of course, is there any need of God or of souls for the cosmic machine to function.

Religion, on the other hand is characterized by belief, moral codes, ceremony and rite, and tradition, emphasizing the transcendent dimensions of freedom, destiny, etc., indeed, precisely those dimensions that do not apply to machines. These, in turn, make a profound impact on history, society, and the individual (Brancazio, 1994, p. 893). Religious knowledge along these dimensions is not based in observation and

1 This is not, of course, to deny that scientists, as *persons*, value other human beings individually, or that they are unconcerned with the ethical issues of research on human beings.

2 This is not, of course, to deny that religion maintains general doctrines about humanity (e.g. all are “fallen”), yet those doctrines always turn the focus of concern back to *this person this community* (therefore, seek your *own* salvation).

experiment, but rather in divine revelation which has been recorded in scriptures and passed down in tradition. That knowledge, in turn is not quantifiable, and indeed, not objectively (i.e. publicly) measurable. Rather, the transcendent works privately, internally, on the heart and mind, and since those effects are the free, that is: *not* mechanical, responses of heart and mind, they are not repeatable.

The properly religious domain, we might say, is invisible to science, while religion lacks the investigative and mathematical tools to address the properly scientific domain. When the scientist prays to God, she is not *doing* science; when she measures spectra of light from distant stars, she is not *doing* religion.

The invisibility of the religious domain to science may be indicated by its inability to settle religious questions. Liderbach (1991, p. 1) writes:

The data of physical nature led Isaac Newton in the early-18th century to discover the will of the creator in the design of the creation. However by the late-18th century that same data, inductively studied, permitted Pierre Laplace to conclude that God was no longer a necessary hypothesis; the world could be studied as a mechanism that is inductively comprehended.

Evidently, neither God nor God's absence was positively discernable in the data. But science proceeded to follow Laplace's lead, writing God completely out of the equation. Liderbach continues:

Then the revolutionary inductive hypothesis of Charles Darwin late in the 19th century led to the reactionary, evolutionary vision that there was no evidence of beneficial design of any kind. The Victorian world reeled at Darwin's vision that the

world had evolved by pure chance. God had apparently slipped out of the worldview of Europe's intellectuals. (Liderbach, 1999, p. 1)

Yet religious faith and belief in God has not become extinct, even among Europe's intellectuals. The scientific project, far from casting God out of existence, has rather forced the world to recognize that God is not a *datum*, a phenomenon to be measured. People of faith have accordingly refined their concept of God, recognizing in His absence from the world *as seen through scientific eyes*, that is, His transcendence.

But it may be more accurate to say that people of faith refined their language, and their understanding of language. As Wittgenstein maintained, discourse can be understood as a kind of language game, with its rules and definitions, and in the context of which words take on meaning. There are many such games, and the same words will mean different things in different games (Stiver, 1996, p. 61). From this perspective science and religion constitute two distinct language games and when the two seem to be making statements about the same things, they in fact are not. "God exists" means something wholly different when uttered in the context of the religion game from when uttered in the context of the science game. Holtzman writes that "Religion tells us that ultimate reality can be in some sense understood, not explained" (2003, p. 86). I should rather say that religious language is part and parcel of a way of being. To say "God exists", explains nothing, but is rather an act of faith in which I orient myself towards the ultimate, thus giving ultimate significance to my existence and to my choices; the truth of the statement is in the truth, or authenticity, of my being. Scientific language, on the other hand does precisely what religious

language does not: describe and explain, objectively, without reference to the one who uses the language. “God exists” is a proposition to be tested, by formulating falsifiable predictions, and its truth or falsity has nothing to do with the person who says it. The science language game, in other words, does not “reach” the domain of religion:

Linguistic analysts agree with logical positivists, however, in insisting that scientific language itself has a limited and essentially technical function which is always closely tied to its own distinctive type of observations. We will call this a “positivistic” view of science, the view that scientific inquiry does not yield any metaphysical generalizations about the nature of reality [...] Scientific theories are useful tools for summarizing data, making predictions, or controlling processes; they are not representations of reality. Science deals with regularities among phenomena, and it has no wider metaphysical or theological implications. (Barbour, 1966, p. 124)

The language-game argument would seem to be very much what Galileo was reaching for in saying that the Bible might disregard the material facts for the sake of the message of salvation.

Langdon Gilkey makes a similar point. According to him, scientific theories aim to explain the facts of experience by law, those laws being subject to objective verification/falsification. God, in religious discourse, is a personal, yet transcendent being, who is the source of all systems. But that discourse has to do with the meaning of things, and involves special, i.e. subjective experiences. Religious beliefs cannot be falsified by evidence, rather they have their validity in that they generate confidence,

hope, and trust. Science offers information; religion offers guidance and direction, the promise of healing, reconciliation, and fulfillment (Gilkey, 1993, pp. 63-64). Science and religion then would appear to have very different agendas. They are not in conflict, because they are not aiming at the same prize.

It will be objected that religion too deals in matters of fact in claiming the existence of supernatural beings such as spirits, souls, and deities. God is an intelligent, purposive being that *is there*. Even some religions insist that supernatural beings exist *factually*,³ supernatural, or spiritual, beings are by definition beyond the purview of science, which is concerned with natural, material, existence. Whether or not (and in what sense) supernatural beings exist, they are not public and repeatable phenomena, and are hence inaccessible to scientific method. They are rather accessible only to unique, inner, essentially private, experience. Once again, then, there is no overlap of domains (cf. Brancazio, 1994, p. 894). But what about miracles? Does religion not claim that the supernatural intervenes in the world, actual having physical effects—for example through the healing waters of Lourdes? If so, then the religious is intruding upon the domain of science. This would be a serious objection to the independence model, were it not for the fact that religion does not, by and large, insist on the reality of such “miracles”. The Roman Catholic Church, for example, generally prefers to remain officially silent. The independence model, however, takes it that true religion is concerned with meaning, freedom, destiny, and the like, not with miracles or the actual existence of supernatural beings.

In short, whether considered as standpoints, methodologies, language usages, agendas, or statements about what exists, science and religion occupy different, non-overlapping domains. The religious domain is that of the lived meaning of each

3 That may be a contradiction. Scientists, and many others, would tend to define “fact” in a way that excluded the supernatural, without denying (or confirming) the existence of the supernatural in some other sense.

concrete lived life; it is concerned with inner, thus private, experience and a transcendent, possibly supernatural, realm that opens only to that inner experience. The scientific domain is that of public, measurable, repeatable events; its project is describing and explaining them on a more-or-less mechanical model. Accordingly, in the independence model, there can be no logical contradiction between religion and science. This model appeals to many advocates of religion and advocates of science (and those are often the same people) because it gives them the freedom pursue each type of activity without concern that they may be harming the other. Each preserves its distinctive character.

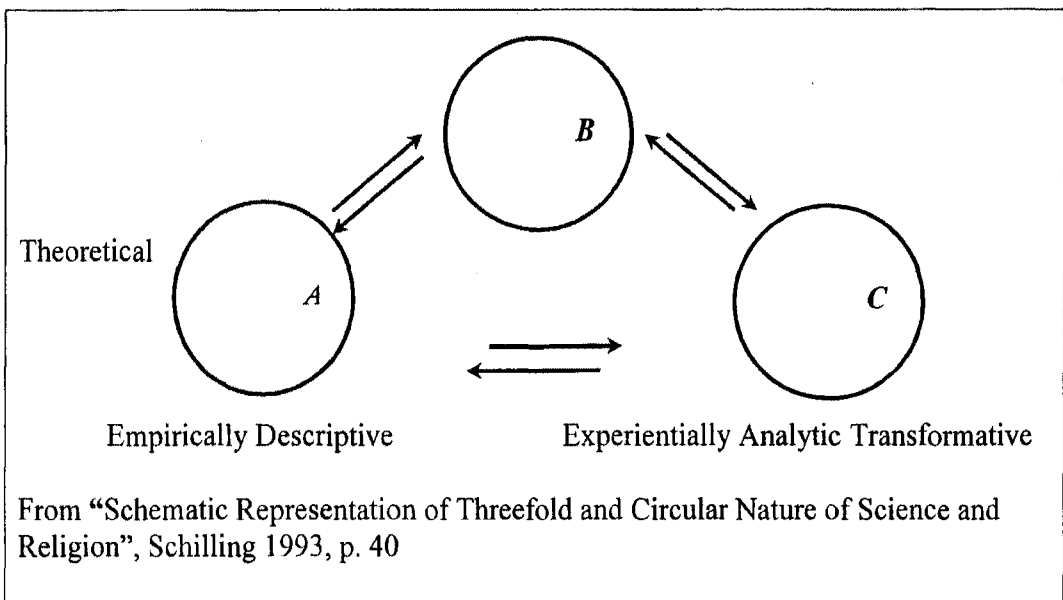
2.3 *The Dialogue Model*

Like the conflict model, the dialogue model has science and religion as distinct activities with overlapping domains of concern. Conflict is thus possible in the area of overlap, however conflict may not be logically necessary: there is room for dialogue. Barbour writes:

Dialogue portrays more constructive relationships between science and religion than does either the Conflict or the Independence view. [...] Dialogue may arise from considering the presuppositions of the scientific enterprise, or from exploring similarities between the methods of science and those of religion, or from analyzing concepts in one field that are analogous to those in the other. In comparing science and religion, Dialogue emphasizes similarities in presuppositions, methods, and concepts. (Barbour 2000, p. 23)

While the significance of the differences between science and religion articulated in the independence model remain for the dialogue model, there are also similarities and parallels, opening up the possibility of fruitful dialogue. Indeed, science and religion, on this model, could work together to address human problems and to benefit humanity. Or better: with the dialogue model the fact that science and religion do sometimes work together becomes comprehensible.

A number of writers point to structural similarities between science and religion, Hans Kung (1993, p. 58) writes “The rules of the game in theological science are not in principle different from those of the other sciences.” Harold Schilling gives some detail to what he maintains are similarities of objective and method between religion and of science. In “The Threefold and Circular Nature of Science and Religion” (1993, pp. 40-46), he maintains that religion and science both involve a feedback cycle with three nodes: (A) empirical/experiential: descriptions of data; (B) theory: generalization, explanation, and prediction; (C) transformation: applications of the theory and of laws. In Science, (A) experiments and observations generate data systemized into laws; (B) theories are formulated to account for the laws, but those theories also heavily influence the search for and interpretation of data; (C) theories and laws are both transformed into applications, technology, but also experience with technology influences both data gathering and interpretation on the one side, and theory construction on the other.



The general structure of the model, Schilling claims, obtains for religion as well. For religion, node (A) includes scripture and personal experience, and the descriptions of them; node (B) includes theology, which is derived from scripture and experience but, in turn, influences experience and the interpretation of, and attitude towards, scripture. (C) Would include social action, inspired by both theology and scripture/experience, but also influencing them in turn. In Huchingson's words, for Schilling, "science and religion differ radically in content and specific goals, but they share a general approach for achieving understanding and changing the world. This similarity in objective and method makes dialogue possible and desirable" (Huchingson, 1993, p. 40-43).

It is also often argued that there are what we may call similarities of attitude. Mary Midgley, in her article "Mixed Antitheses" (1993, pp. 35-38), suggests that religion and science represent complementary parts of the human project, rather than starkly different projects of which one must choose one and reject the other. She lists a large number of commonly encountered antitheses that are somehow connected to the science-religion antithesis. These include:

science	v.	superstition
reason	v.	faith
empiricism	v.	rationalism
determinism	v.	free will
reason	v.	emotion
objective	v.	subjective
male	v.	female

From Midgley 1993, pp. 35-36

Midgley notes that reason turns up on both sides of the list, and that (among what I have reproduced) we would not want to eliminate any of the items, with the possible exception of superstition. Indeed they are complementary or even opposite sides of the same thing. We could not have science without both empiricism and reason. Neither could we have religion without both reason and faith. Scientists, she writes are motivated by the emotions of curiosity and the “aesthetic criteria of elegance” (p. 38). As we have noted previously, there is a necessary element of faith in science as well.

Going into somewhat more detail, Richard Neibuhr (1993, pp. 47-56) argues that there is in science and the scientific community “something akin to” the complex of faith, trust, and loyalty that characterizes religion. He argues that the general public has come to trust science and scientists because scientists, for the most part, have not only been faithful in their pursuit of truth but that they have *told* the truth, communicating their findings openly to the whole human community, not allowing their findings to be used to deceive. Scientists have been loyal to the human community in attempting to benefit, rather than to harm, humanity—all humanity rather than any limited (e.g. national) interest. Scientists are concerned with the ethics of research, recognizing that there are values, such as human life, greater than the particular truths that they seek.

Science, like theology, writes Neibuhr is self-critical. In an internal movement like the theological *via negativa* which strips all that is limited and relative from the concept of God, science, according to Neibuhr has “dethroned its efforts to define all things and processes in terms of number or after the model of the machine.”⁴ Like religion, science values, if in a different way, all of existence: every phenomenon is worthy of study. Science, like religion, includes a firm faith in being. The world, science assumes and believes, *is* rational, events and beings *are* related to each other in reliable, discoverable, and describable ways.

Scientists acknowledge that discovery often comes through inspiration, flashes of creative insight, and faithful imagination. This seems not unlike religious experience. Moreover science seems to be asking the great questions of our time. In this since, especially recalling that many of the great scientists of the past were not only men of faith but felt inspired by that faith, religion may be said to inform science.

On the other hand, commenting on Kung’s “On the Relationship of Theology to Science”, Huchingson remarks that “the discoveries of science [seem to be] relevant to theology in ways that theology is not relevant to science” (Huchingson, 1993, p. 4). As previously mentioned, scientific discoveries often force people of faith to refine their understanding of their own creed. The heliocentric model of the solar system helped Europe to overcome the image of God as an old man in the sky, and to develop a more sublime conception. The theory of evolution is forcing a more profound understanding of creation. Religion, in other words is enriched by the challenges that come from science. Kung, like many thinkers, reiterates this point,

4 I might rather say that science had dethroned naive forms to mathematization, mechanism, and positivism than that these had been dethroned altogether. But his point remains valid given that such debates occur in the scientific community, as indeed debates about the nature of God continue to occur in theology.

while, also like many theologians, reserving for theology the domain of what Neibuhr calls “ultimate concern”.

There do appear to be parallels between science and religion and they do indeed seem to inform each other in significant ways. The dialogue between them is real and evidently more than merely verbal. In his message to theologians and scientists on the three hundredth anniversary of Newton’s *Principia*, Pope John-Paul II said:

Turning to the relationship between religion and science, there has been a definite, though still fragile and provisional, movement towards a new and more nuanced interchange. We have begun to talk to one another on deeper levels than before, and with greater openness towards one another’s perspectives. We have begun to search together for a more thorough understanding of one another’s disciplines, with their competencies and their limitations, and especially for areas of common ground. In doing so we have uncovered important questions which concern both of us, and which are vital to the larger human community we both serve. It is crucial that this common search based on critical openness and interchange should not only continue to grow and deepen in its quality and scope. (cited in Russell, Stoeger, & Coyne 1988, p. 8.)

2.4 Critique of the Three Models

Taken each in isolation, the models discussed above are mutually exclusive, yet individually plausible. That suggests that there are weaknesses with the models, and in this section I endeavor to uncover some of those weaknesses.

In each of the three models, religion and science are distinct kinds of activity with different methods and goals. The models differ, first, in whether or not there is overlap in the domain that each approaches with its methods and goals, and second, in whether, within the overlap, the two are necessarily in conflict, or whether there can be some rapprochement or even cooperation. These differences may be traced to (or expressed in terms of) differing evaluations of the metaphysical implications of the differing epistemologies of science and religion. The models vary also in the extent to which they are prescriptive, advocating a preferred relationship, as opposed to descriptive, describing the actual relation. To the extent that they are descriptive, they also vary in the extent to which they describe an actual social-political relation as opposed to a necessary, logical, relation.

2.4.1 Conflict.

The conflict model is exemplified by the battles that ensue when scientific discoveries seem to contradict articles of religious belief, currently, the battle between advocates of the theory evolution and the advocates of belief in divine creation. The parties to the conflict are literalists on the one side and materialists on the other. The literalists making the metaphysical claim that their epistemological sources—scripture and/or tradition—are true *in every sense*. Thus while “God created the world” says something about the meaning of human existence, it *also* says something factual about how the natural world physically came to be. And salvation, for the literalist, depends

on believing and defending the literal, physical meaning of that claim. This puts literalists into conflict with a particular scientific claim, not necessarily with science as such. Materialists, on the other hand make the metaphysical claim that that reality that is visible to scientific methods is the whole of reality. Thus the supernatural simply *does not exist*. They may often take as well the positivist stance that unverifiable statements are meaningless, and like the literalists' attitude to creed, extend that to the metaphysical claim that statements about the freedom, destiny, and so on, as well as about the supernatural, are meaningless *in every sense*. Thus, while materialists may not oppose the private practice of religion, they are likely to try to keep it out of public life.

This much describes an existing conflict. I argued above that, given this model, the conflict is logically necessary: the domain of religion and of science each comes to claim the whole as its domain. Religion would strip science of the freedom of inquiry, thus destroying it. Science would extend its investigations even into the most sacred heart of religion, thus reducing it to, at best, a useful social institution.

The existence of individuals who are both deeply religious and committed scientists immediately calls the model into question, as does the fact that many churches have no objection to the theory of evolution, or to scientific research in general. The limitation of the model, it seems to me, is first that literalists hardly represent religion as such; they rather represent a, perhaps small, faction within Christianity. Second, science does not entail *metaphysical* materialism, and many scientists are neither materialists nor logical positivists: utilizing an epistemology does not require adopting a metaphysics. This model then would appear to be little more than a description of a particular controversy among a limited number of opponents. The only prescription yielded by this model would appear to be: fight on!

2.4.2 *Independence.*

The independence model resolves the conflict by withdrawing the metaphysical reach of the contenders. That which is amenable to scientific methods is not the whole of being, and scripture and creed are true only in a limited, albeit ultimate, sense. In fact, the domains of science and of religion rather neatly exclude other, thusly neatly resolving, or *dissolving*, the conflict, at least on the logical level. The resolution seems a bit too neat, however, especially considering that the battle rages on and that religion and science frequently engage in constructive dialogue as well. The independence model would seem to relegate dialogue, no less than conflict, to misunderstanding.

The independence model, I suggest, excessively restricts the metaphysical claims of each. In this model religion has to do with meaning and with active reconciliation with God. The creation myth, then, tells *nothing* about what “happened” in the past, rather it is really *as if* God had fashioned us of clay with his own hands, really *as if* we had fallen from Him by an act of disobedience. Believing the myth, or the attendant creed, is to assimilate these stories as our own meaningful history: it is really as if *my* ancestor rebelled against the God who made him. We may speak here of myth-history and mythical truth which has *no* necessary bearing on literal history or literal truth.

Miracles would seem to be an intrusion of one domain into the other. I argued above that, within this model, miracles are not a necessary part of true religion and thus may be disregarded. One miracle, however, cannot be disregarded. The incarnation, death, and resurrection of Christ, as effecting the *actual* reconciliation with God, are the myth become real. Christianity insists, and must insist, not only that

the Christ event is myth-history and mythically true, but also that it occurred in literal history. This is the *Krises*, the intersection of the sacred with the profane, the transcendent with imminent nature, of myth with history. As a transcendent event it is not observable and beyond the domain, or interest, of science. As a literal historical event it is well within the purview of science. And indeed the believer would suppose that a team of scientists, had they existed then, would have confirmed that the man died (not: went into a coma etc.), and two days later came alive again. From the Christian point of view, the event cannot be reduced to one or the other; its very significance is that it is both—the paradox being expressed in such doctrines as the dual nature of Christ and the Trinity. The scientist, or supporter of science, who is also a believer will cede the territory to religion, accepting that the incarnation is a Mystery, as the Church indeed calls it. Science as such, however, cedes nothing: if it is in the world it is fair game for investigation, and just as it has debunked the creation myth, so it has profoundly called into question the resurrection of Christ.

In restricting the metaphysical claims of religion the independence model presents an idealized view of religion, a view which is neither historically accurate nor accepted by many religionists today. It is rather a prescription for how religion *should be*; indeed, it is a prescriptive theology.

Similarly, the model presents an idealized view of science. Aside from the fact that much science has been done both in hopes of vindicating religion and of destroying it, studies in intelligence and consciousness may undermine the notion of a soul more deeply than evolution undermines the notion of God. Religion has, in fact, retreated from every piece of dearly held ground, ceding more and more of its domain to science, till all that is left is this subtle and abstract notion of “meaning”. There is

no particular reason to be certain that science will not stumble in its researches upon areas that leave “meaning” in the dustbin with the geocentric cosmos.

2.4.3 *Dialogue.*

This would seem to be the best of the three, acknowledging the fundamental differences between science and religion, yet recognizing sufficient overlap in both method and subject matter to account for the fact of conflict while opening up the possibility of dialogue. Methodological similarities are found in terms of the relationships among basic information (data, law, scripture, creed), conceptualization (theory, theology), and application (technology, social action). Similarities of attitude were found (e.g. both value reason), as were complementary perspectives (e.g. subjective/objective). Neibuhr maintained that scientists in the pursuit of their profession exhibit qualities of faith, trust, and loyalty, similar to those exhibited by people of religious faith. It was maintained that science and religion, in fact, influence and inform one another in positive ways.

Without denying that last point, the similarities may indicate no more than the fact that science and religion are both pursued by human beings. It is the *scientist*, not science, that is faithful and the rest. As Neibuhr himself noted, scientists, for example in Nazi Germany, have not always been so. Certainly, not everyone would agree to the applicability of Schilling’s three-node schema to religion in anything more than the most superficial sense. That schema indeed seems to have no place for the transcendent and for the *guidance* of the transcendent. But in any case it is not at all clear why a superficial similarity of method should necessitate the existence of avenues of dialogue.

As prescription for dialogue, this model is, in my view, unassailable. That prescription, however, is undermined by the weakness of its descriptions of the logical relations between the two realms.

2.5 *Integration*

The models discussed appear sometimes to confuse description with prescription, epistemology with metaphysics, and metaphysics with sociology. The fact is, moreover, that no consensus on the relation between science and religion has been reached in spite of continual discourse over the nearly four centuries since Galileo's letter to Castelli.

All the models treat science and religion as distinct and independent forms of human activity, as it were, self-contained entities, like two independent nations that may or may not have border disputes. In the following chapters I argue for a fourth model, an "integration model" grounded in Whitehead's process philosophy and incorporating his views on religion and science. A more dynamic concept of "entity" will be articulated with which to think about and describe the "entities" of science and religion together with their relationship. It is to be hoped that the integration model proposed here will overcome the limitations of the conflict, independence, and dialogue models, and suggest new possibilities for the evolving relationship.

Chapter III

Whitehead on Religion and Science

3.1 *Whitehead and Process Philosophy*

In recent years, Process Philosophy has become virtually synonymous with the philosophy of Alfred North Whitehead and his followers. Following a notable career in Mathematics and Logic, Whitehead developed his philosophy into a complete system, published in 1929 as *Process and Reality*.

Process Philosophy takes the world as experienced to be the real world. But the world as experienced is characterized by change; it does not appear to immediate experience as an extension of space and time populated by static entities, but as a welter of interrelated emergences. Process Philosophy accordingly understands reality as fundamentally process. This is quite different from the philosophical positions, dominant through most of Western history, which in the search for truth, neglected the relative and contingent in favor of the universal and eternal; which in the search for reality neglected incomplete beings in favor of absolute being. As a consequence, these philosophies, whether Platonic or Aristotelian, tend to neglect life and the world as it is actually lived and experienced, projecting “reality” into either a transcendent realm of forms as with Plato, or into immanent but abstract concepts such as substance and essence as with Aristotle. For both positions, Being is of necessity complete and eternal, as opposed to becoming, which is *not yet* Being. The manifestly incomplete and changing world of experience is then seen as either an imperfect reflection of the real, or as an incomplete striving towards the perfection of an

immanent, if invisible, potential or essence. The world and the things in it, then, are at best, in a state of becoming, not yet of being. From this point of view, the task of the philosopher is to discover the eternal forms or essences so that the world of experience can be made to conform to them, and thus to approach full reality. The temporal and novel aspects of the world as experienced, are then uninteresting and unimportant: *mere* becoming. But that, in turn, leads to the epistemological distinction, Whitehead calls it “bifurcation”, between appearance and reality. In the traditional view, the world that we perceive and experience is not “reality” but only appearances, somehow connected to the “real”. The task of philosophy, then, became the task of discovering the (presumably eternal) real “behind” appearances.

But if reality is eternal, the fact that the world of experience is characterized by change becomes a problem. Relegating the world of experience to “mere” appearance answers nothing: how is it that the appearances are fundamentally changeable if the reality “behind” them is static? Or: if the reality is changeless why should it “appear” to change. One important way in which the problem has been posed is in terms of identity. How is it that a thing changes, yet remains the same thing. For example, a young child, over the years, becomes an old man. In spite of the fact that the old man is very different from the child, we say that he is the same person. In what does the sameness consist? The answer, as articulated by Aristotle, is that each individual thing is composed of substance, essence, and accidents. Substance expresses the fact *that* something exists. Essence determines *what* that thing is. Accidents are other, non-essential qualities. Substance and essence do not change. By virtue of distinct substances, entities are distinct from each other—though they may have the same essence. And by virtue of the unchangeability of substance and essence the thing remains the same over time and in spite of changes; what

changes are the accidents. The terminology is Aristotle's, but something very like this was held before him and has continued to be held by mainstream Western thought into modern times. Plato would phrase it in terms of bits of primordial matter informed by Ideas of Forms. Being, then for most of Western philosophy has been held to be composed of independent self-contained beings, distinct substances (or bits of primordial matter) informed by essences (or Forms). The world of experience, then, is composed of distinct beings that are not fully real in as much as they fail to correspond to the Form or to their essence. For convenience, I shall refer to these philosophies as "philosophies of substantial being". Of course the beings interact with each other and one of the problems of philosophies of substantial being is accounting for the relations among beings, including the question whether the relations themselves are beings. Still, the beings are self-contained in that they are in no way constituted by their relations, the situation is rather the reverse: beings are ontologically prior; relations are constituted by beings.⁵ For our purposes here, the significant features of philosophies of substantial being are, first, that they understand reality to be constituted by self-contained static beings and the relations among them, and second, that the world of appearances is not fully real, though it is somehow connected to full reality.

It is well known that Whitehead was himself something of a Platonist in his doctrine of eternal objects, or abstract forms. Moreover, he takes over Aristotle's concepts of efficient and final cause in describing the origination and completion of a process. But Whitehead sets philosophies of substantial being on their collective head by taking the world of experience, the natural world and the human sphere as fully real. The appearance is the real. Again, however, the world as it appears to us is not

5 If the relations themselves are conceived as beings, the problem reappears as: how do relation-beings interact with thing-entity?

one of isolated self-contained and static beings, but of events, that is: of dynamic relations and processes. Rather than an eternal if invisible Reality, then, for Whitehead reality itself is visible, dynamic, and historical, deriving from a past and projecting a future. There is, for Whitehead no unchanging subject of change (Whitehead, 1979, p. 29), no substance with changing accidents. The entities do not go through processes; rather the processes *constitute* the entities (Whitehead, 1979, p. 23). Identity and individuality, then, are matters of lines of continuity rather than of underlying substances. As such, reality cannot be understood with the language of substance.⁶ Whitehead has, accordingly developed a language of process, and Process Philosophy is now a well defined and influential tendency of thought capable of going beyond the frontiers, and problems, of philosophies of substantial being.

Process Philosophy is a general theory of reality concerned with what exists and how best to understand it. It is, in short, metaphysics. The fundamental premise is that processes are ontologically prior to beings: reality is best understood in terms of processes rather than in terms of beings and the relations among them. Change is an irreducible feature of reality. Cobb and Griffin write:

Process thought by definition affirms that process is fundamental [...] There are unchanging principles of process and abstract forms. But *to be actual is to be a process. Anything which is not a process is an abstraction from process*, not a full-fledged actuality. (emphasis added) (Cobb and Griffin, 1976, p. 14)

⁶ Sometimes he refers to his central concept, “actual entity”, as “substance”, but this is radically different from Aristotle’s notion.

Reality consists of processes in multiple complex relations with each other. Those processes are not random, but have direction, and hence may be said to be in a continual state of becoming. In other words reality consists of relational processes of becoming.

Whitehead did not originate Process Philosophy, but rather advanced an existing strain of thought. Process philosophers include, for example, Heraclitus, Herbert Spencer, Samuel Alexander, Henri Bergson, John Dewey, William James, George Herbert Mead, Charles Pierce, and Charles Hartshorne (Reck, 1984, pp. 185-220). Interestingly, Buddhism in its denial of a “self” and of enduring substances in general, and in its consequent attempts to account for existence without them, would seem to have developed varieties of Process Philosophy as well.⁷ Whitehead’s contribution was to create a rigorous language for describing process at the ontological level, and using that language to articulate Process Philosophy as a robust system potentially capable of embracing a wide range of human experience. Process Philosophy is, as a consequence, now accepted by many philosophers.

3.1.1 *The significance of Process Philosophy.*

Traditionally, philosophy has concerned itself with reality in its religious, ethical, aesthetic, and natural dimensions. In the modern period, natural philosophy, or science has increasingly come to define our understanding of reality. Physics, it is often felt, is where the final understanding of all reality will be found. On the other hand, it is often remarked that the natural sciences are inadequate to account for or even to address aesthetic, ethical, and religious facts of experience. Process Philosophers agree, pointing out, for example that scientific modes of thought cannot

⁷ See, for example, the twelfth (?) century *Abhidhammasangaha* for striking parallels to Whitehead’s conception (ASBB).

explain many common-sense beliefs. Indeed, the nature described by science seems not to be the nature which we actually experience. For example, the current scientific mode of explanation would have it that our thoughts and actions are wholly determined by antecedent, i.e. efficient, causes. In practice, we believe otherwise, acting as if there we were making choices. That kind of belief, in the view of Process Philosophy, should not be explained away, perhaps as also determined by efficient causes, but taken as a primary datum, evidence, perhaps, for the reality of final causes. Yet scientific understanding is also derived from human experience and its findings are in a real sense true: as Whitehead famously wrote in *The Concept of Nature*, “science is not a fairy tale” (Whitehead, 1964, p. 40).

Philosophy is integrative and one of its central tasks is to come to a general understanding of reality that includes and harmonizes the various ways in which the world is understood and experienced. Accordingly, much of Whitehead’s work involved the search for a metaphysical basis for the natural sciences capable also of including actual experience *as lived*. That would include aesthetics, ethics, religion, and the like. Process philosophy also aims at applicability. Whitehead and Hartshorne subscribe to Pierce and James’ pragmatic maxim that if an idea cannot be lived in practice, it should not be affirmed in theory (Craig, 1998, p. 1).

Process Philosophy has implications for multiple fields:

- The human person: As a relational process of becoming rather than as a fixed substantial being, the human person is understood as responsible, as seeking justice, as being creative, as seeking creativity and adventure. The person is not self-contained self-referential actor who happens to find himself in an arbitrary arena called “world”, rather, “The world process is not and could not be a sheer contrivance; it is and could only be a multi-life in an embracing life” (Hartshorne, 1971, p. 211). We are, in this

view, interrelated, our very existence bound up in community. Indeed, “what we ordinarily call individuals, the sorts of things that endure through time, are not true individuals, but are ‘societies’ of occasions of experience” (Cobb and Griffin, 1976, p.15). If it is true that we shape ourselves, it is also the case that the one who shapes and who is shaped is a multiplicity of relations and forces, a confluence of experiences.

- Religion: “Since religion is not simply one aspect of human existence among many, but the organization of the interior life, the history of religion is the inner development of human beings that supervenes upon the completion of the biological-evolutionary process” (Cobb and Griffin, 1976, p. 85). The purpose of religion is not only to fill empty minds with knowledge but also a way of life, a drive for beauty, harmony, intensity, contrast, and richness of experience. Religion seeks the vision of relational processes of becoming.

- The sciences: Whitehead began the researches which led to Process Philosophy in attempting to correct what he felt were incoherencies in the model of reality then assumed by modern science. He hoped to give the natural sciences a more adequate mathematical and logical foundation. His system accordingly, is highly mathematical, and has of necessity incorporated new discoveries. Process Philosophy also attempts to liberate the natural sciences from the mechanistic, deterministic models of substantial beings and their relations and to supplant that model with the model of relational processes of becoming. That model is held to be more coherent, consistent, adequate to the facts, and congruent with the best in the contemporary scientific enterprise itself (Hartshorne, 1971, p. 1971).

In short, Process Philosophy is one helpful way of understanding the nature of reality. As developed by Whitehead, that philosophy is wide and profound, providing

a system applicable to all aspects of our lives. It has been utilized to provide insights into aesthetics, biology, economics, education, interpersonal relations, physics, physiology, political theory, psychology, the relationship among the world's religions, and theology. As a comprehensive system, Process Philosophy is itself a relational process of becoming. Therefore, Process Philosophy can be practiced, adapted, and applied to various paradigms, offering thereby a vision of hope for living together in harmony. Taking relational processes rather than fixed entities as fundamental, Process Philosophy is able fruitfully to address issues in sociology, political science, biology, economics, and ecological justice. "[P]rocess thought proposes [...] that in the course of cosmic and biological evolution, the individual entities change as they find themselves in different environments. For any entity is what it is by virtue of its internal relations to other entities" (Birch, 1998, p. 4). Process thinkers work toward changing harmful and restrictive social structures to reflect relational processes of becoming in reality. "It is a kind of relation between things such that though they are felt to be different from each other, they are yet felt to be not merely different" (Hartshorne, 1971, p. 45).

3.2 *Process Philosophy*

In this section I give a more detailed exposition of Whitehead's philosophy.

Above, Process Philosophy was introduced as a critique of philosophies of substantial being. More particularly, Whitehead critiqued what he called "scientific materialism" or the "classical concept" of modern science.⁸ That is, the implicitly metaphysical theory that the cosmos consists of particles of matter in uniform and absolute space and time (Lowe, 1991, pp. 35, 36). Matter, in this conception, is the

⁸ I shall use the term "scientific materialism" to avoid confusion with classical Greek conceptions.

Aristotelian substance or Platonic primordial matter. Since the “beings” of ordinary experience are manifestly composite and manifestly not eternal, the beings of which Being consists are conceived as tiny irreducible particles, “atoms”.⁹ Space is understood as a uniform extension of dimensionless points, time as a uniform unidirectional succession of durationless instants. They are conceived as absolute in that the points of space and instants of time exist without reference to anything else. In this view particles of matter are located at points of space and instants of time. Moreover, the particles are *in* space and time in such a way as to have no *effect* on space and time; space and time, in turn have no effect on each other. As Whitehead colorfully put it in *The Concept of Nature*, “The course of nature is conceived as being merely the fortunes of matter in its adventure through space” (1964, p. 20). Lowe notes that this conception was under attack from all sides early in the twentieth century (Lowe, 1991, p. 66) as it became clear that it did not correspond to lived life. Whitehead’s approach was unique, first, in that he critiqued scientific materialism on logical and mathematical grounds, and second in that he sought to construct an alternative, more adequate conception for science.

Whitehead held that the scientific materialism was “incoherent” (e.g. Whitehead, 1964, p. 21ff). What he meant was that while the distinct conceptions of space, time, and matter were each internally coherent, there were no necessary logical or mathematical connections among them. From the logical standpoint they were three independent systems arbitrarily pasted together. That observation, of course, did nothing to call into question the discoveries and theories of the sciences. Rather, it was a matter of the inelegance of employing multiple systems to describe a single world. But with the field theories of the Nineteenth Century, and with Relativity and

Of course by the time that “atoms” were found to be composite, thus not atoms strictly speaking, it was too late to change the name, and we have the oxymoron, “sub-atomic particles”.

Quantum Mechanics of the early Twentieth, scientific materialism became manifestly inadequate for physics itself (Bohm, 1992, p. 385). Time, space, and matter do, after all, affect one another and the smallest “particles” seemed often to behave like waves, the smallest “waves” often behave like particles. On logical and on physical grounds, and from a purely scientific point of view a single coherent system replacing the three systems of space, time, and matter, was needed. Whitehead set out to construct such a system.

Although through most of his career Whitehead explicitly avoided metaphysics, he was always concerned with an additional incoherence: the incoherence of scientific materialism with actual lived experience. The world of experience is, in a word, messy, “radically untidy” in Whitehead’s words (Whitehead, 1929, p. 157), unlike the “neat, trim, tidy exact world” that science tries to describe (Whitehead, 1929, p. 158). The single system that he hoped to construct would unify the conceptions of space, time, matter, and ordinary perception in a way that embraced both the natural sciences and lived experience.

But the empiricism that cleared the way for modern science, together with scientific materialism had also given rise to a conception of human perception that was deeply problematic. Elegantly articulated by Hume, British epistemology especially was dominated by the idea that sense perception proceeds by way of reception of discreet bits of sense data: color, line, pitch, odor etc. Those bits of data then were composed into meaningful wholes by the mind. But also, we know nothing of the world except through sense perception. With this view, the world of experience, the world “in” which we live and move, is a mental construction, the real world is “out there” and we have no access to it. Even the bits of sense data from which we construct our “world” are not things in the world but interactions of *whatever* is out

there with our sense organs. This is a modern formulation of the classical appearance-reality distinction, a version of what Whitehead calls “bifurcation”, a wedge driven between the “real” world and human experience. This scheme seems to mesh nicely with scientific materialism, with particles and waves striking the sense organs, and the brain synthesizing the consequent chemical reactions. But there are deep problems with it. For example, we cannot adequately explain how it is that multiple individuals construct their numerically distinct “worlds” in ways that are similar enough to allow of communication and even to support the feeling that we live in a *common* world.

This problem is connected to the problem of universals: how is it that multiple particular things are the same kind of thing, and/or how is it that we recognize that sameness? If this thing and that thing (and a potential infinitude of other things) are both tables, then in what does tableness consist and how do we recognize it? And would we not still know tableness if all the tables were destroyed? Hume, of course did not originate the problem of universals, but his theory of perception radically intensifies the problem: how is it that the disconnected millions of bits of sense data are again and again, by distinct minds and at distinct instants of time, assembled into the image or idea of “table”? But too, if what we perceive are bits of sense-data, not the world itself, then we cannot account for identity over time: how is it that what is mentally assembled from *this* collection of bits of sense data is the same in any meaningful way as what was assembled from a different collection yesterday? If perception worked in this way, and if everything we know came from perception, then even the particles and waves moving through space and time would be fanciful mental constructions of sense data, and empirical science would be impossible.

Such problems prompt Whitehead to assert that such theories of perception are incoherent. In particular, he rejects the bifurcation of nature and takes the world of

experience as the real world, refusing to relegate it to “mere” appearance “behind” which in some mysterious way, the “real” world of physics lurks: the nature that stands in front of us is the one real nature (Whitehead, 1964, p. 4). He then notices that we do not in fact *first* perceive bits of sense data which are *then* assembled by a mental act. Rather, we perceive already formed wholes. Even then, we perceive not collections of independent items but an ever-shifting complex of relations. The entities in the perceptual field are “relata” rather than “distinct individualities” (Whitehead, 1964, pp. 12-13). One sees the tree-in-the-park as a whole, one sees the blue-of-the-sky as a whole; the tree, the park, the blueness, and the sky are abstracted from the initial perception rather than assembled from discrete bits of data.

In a similar way, Whitehead takes the line to be prior to the point and the vector as prior to a dimensionless particle with speed and direction (Lowe, 1991; Whitehead, 1964). The point is abstracted from the line; the particle (and space and time) is an abstraction from the vector. Generalizing to lived experience, he takes relations to be prior to entities (Whitehead, 1964; Whitehead, 1979). It is, to coin my own example, the *relation* “transmission of knowledge” that defines the *entities* “student” and “teacher”, not vice versa.¹⁰ Here, then, we have the beginnings of a unifying conception of science and lived experience that is coherent with ordinary perception.

Whitehead further observes that we experience the world in terms of events (Whitehead, 1964, p. 52). That means also as durations rather than as successive instants of time (Whitehead, 1964, pp. 48-73). For example we cannot hear musical pitch in an instant or even in a series of distinct instants. Even from the point of view

10 Sayer (2000, p. 13) evokes a similar example.

of physics, pitch, as vibration, only exists in a certain minimum duration: in an instant it is literally nothing.¹¹

Whitehead, however, does not want to demolish scientific materialism without further ado. It has had, and continues to have, utility in certain contexts. Moreover, he needs to account for how we could have arrived at a conception so at odds with actual perception and experience. In other words, he needs to include scientific materialism somehow within his own system. He does so, quite elegantly, by showing that matter, space, and time are abstractions from a more fundamental standpoint/conception. We *perceive* relations, he writes in *The Concept of Nature*, but we *think* in entities (Whitehead, 1964, p. 13). In other words we abstract entities from the perceptual field in order to have units for thought. From perceived events it is useful to abstract durations, extensions, and beings. From those in turn it is useful to abstract instants of time, points of space, and particles of matter (Whitehead, 1964 e.g. 13ff, 33ff). There is nothing wrong with abstraction. Indeed thinking is impossible without it (Whitehead, 1967, p. 59). Scientific materialism, then, is a useful set of abstractions from the larger context of events. Whitehead takes abstraction to be simplification: abstract does not imply unreal, but only lifted out of context (Whitehead, 1967, chap. 4). The cat's smile, for example, is an abstraction from the total event of the cat's face, the cat, and the cat's situation. Thus it may be real, and it may be useful to *think* about that smile in isolation. But its actuality consists in its relation to the cat. If we imagine the smile as actually existing without the cat, we have committed the fallacy of what Whitehead calls "misplaced concreteness" (Whitehead, 1967, p. 58; Whitehead, 1979, p. 7). That is, we have taken an abstraction as a stand-alone concrete entity. More precisely: We have conceptually simplified an event,

¹¹ See, e.g. Whitehead's *Concept of Nature*, Chapter III, "The Anatomy of Some Scientific Ideas", and *Modes of Thought* pp. 103ff. for cogent discussions of the primacy of duration over instant.

formulating a part of it into a single concept; that is abstraction. Then we take that single concept as corresponding to an objectively existing *independent* entity; that is misplaced concreteness. Having performed abstractions from an event, it may naturally follow that we attempt conceptually to reconstruct the total event out of the abstracted parts. If in doing so, we take those parts to be *prior* to the event, i.e. objectively independent entities from which the event is objectively constructed, we have once again committed the fallacy of misplaced concreteness. Instants of time and their reconstruction into uniform absolute time is an abstraction from the passage of events as experienced (Whitehead, 1964, p. 34). Points and their reconstruction into uniform absolute space is a similar abstraction. Bits of matter, or individual entities in general, whether atoms or persons or institutions, similarly are abstractions from the totality of the events of experience (see, e.g., Lowe, 1991, pp. 36-43). Again, such abstractions may well refer to real aspects of reality; the problem is taking them as existing independently of the context of their events, i.e. misplaced concreteness.

We perceive relations and events: occasions. Whitehead insists that we perceive relations as directly and immediately as we perceive sense data (Lowe, 1991, p. 75), thus contradicting Hume's assumption that we only perceive discrete bits of color, sound etc. and resolving the empiricist dilemma that we do not perceive causation. But, we perceive relations embedded in events: "The ultimate fact for sense-awareness is an event" (Whitehead, 1964, p. 14). But those relational events appear as embedded in wider and wider networks of relational events, including much that is beyond what is literally sensed. In seeing a cupboard, for example, we are aware of the inside of the cupboard behind the surface, in a few notes we may hear an entire musical phrase. This phenomenon, Whitehead calls "significance" indicating that immediate sense perceptions refer immediately to a whole complex of relations

beyond the sensual field, a reference that occurs without any mental act of construction or of inference (Whitehead, 1964, p. 51). Indeed, Whitehead goes so far as to remark that, “The immediate fact for awareness is the whole occurrence of nature” (Whitehead, 1964, p. 14). But that suggests also that awareness continually draws into experience such non-physical phenomena as ethics, aesthetics, religion, and the like. To say so would have been beyond the scope of *The Concept of Nature*, but Whitehead’s hope of an all-integrating conceptual scheme points clearly to such an extension.

Whitehead finds the integrative principle in the idea of process. Process, in Whitehead’s system, is the ontologically primordial principle from which time, space, and matter are abstracted (Craig, 1998, p. 1). It is capable of embracing the discoveries of both Newtonian and modern physics. At the same time, giving process ontological priority allows the biological and social sciences to be included in the same paradigm as physics (cf. Whitehead, 1979, p. 309). Perhaps most significantly, the world as actually perceived and experienced and life as actually lived are included, along with such concerns as ethics, aesthetics, and religion.

Events, or occasions, are processes with determinate durations and (for physical processes) extensions. No event occurs in isolation but as part of wider situations along with other events. On the other side, events are composed of “smaller” events related to each other in a variety of ways. The universe may be conceived as a single occasion or event which is a process of processes of processes at multiple levels. Every event, except the cosmos, participates with other processes in larger processes. Every event, in turn contains sub-processes. As such, every event is involved with the whole of the universe and the mutual isolation of entities implicit in the doctrine of substance is eliminated (Whitehead, 1967; Whitehead, 1964).

3.2.1 *Process and Reality.*

In *Process and Reality*, first published in 1929, Whitehead puts these insights into a rigorous metaphysical system. In spite of the fact that the system is admittedly speculative (Whitehead, 1979, p. 3), Whitehead endeavors to begin with what he considers to be the most concrete elements of actual experience. He calls them: “actual entities”, “prehensions”, and “nexus” (Whitehead, 1979, p. 18). Together these roughly correspond what we called “events” above.¹² All else, he claims, is derivative, abstraction (Whitehead, 1979, p. 20). Among these, however, actual entities are fundamental. Prehensions are relations among actual entities, and nexus are collections of related actual entities. Actual entities are the “final facts” with nothing more fundamental from which they are derived (Whitehead, 1979, pp. 18-19). This gives rise to the “ontological principle” of Process Philosophy: that the reason for anything is to be found in actual entities. Or: there is no existence without reference to actual entities (Whitehead, 1979, p. 19). Even God is an actual entity (Whitehead, 1979, pp. 18-19). Electrons, molecules, stones, chairs, people, planets, the universe, are all actual entities. In short, actual entities do the work of substance in other metaphysical systems: they express “that” things exist.¹³ Nevertheless, actual entities are analyzable; they are “drops of experience, complex and interdependent” (Whitehead, 1979, pp. 18-19).

For Whitehead, “entity” means process or potentiality for process (Whitehead, 1979, p. 43). An actual entity is a process of becoming. It arises from what has already become, what is “given”, and develops into its own completion

¹² He was already using the term “prehension” in *Science and the Modern World* and the “actual entity” of *Process and Reality* is nearly identical with the “event” of *Science and the Modern World*. Both concepts undergo refinement in *Process and Reality*.

¹³ Whitehead remarks that his metaphysics is a “one-substance cosmology” (Whitehead, 1979, p. 19).

(“concrecence”, “satisfaction”). The “given” is constituted by prior actual entities that have already become, that are complete. Every new actual entity is an encounter or confluence or intersection of prior actual entities. That process of encounter/confluence/intersection is called “prehension” (Whitehead, 1979, pp. 18-20). Each new actual entity takes its place in the “given” and participates in giving rise to yet new actual entities (Whitehead, 1979, pp. 22-23). The totality of actual entities that form the “given” for an actual entity, that is, all those whose prehensions combine to make up the actual entity, is called the “actual world” of that actual entity. An actual world exists relative to exactly one actual entity and an actual entity exists relative to exactly one actual world (Whitehead, 1979, p. 28). There are as many actual worlds, then, as there are actual entities. On the other hand, those multiple actual worlds obviously overlap, and where multiple actual entities participate in a higher-level actual entity, the actual worlds of the lower-level actual entities will be included in the actual world of the higher-level actual entity. The actual worlds of the table legs and the tabletop, while distinct from each other are all included in the actual world of the table.¹⁴ We may say that each actual entity is distinct as a particular confluence of the prehensions of other actual entities while existing in relations of mutual determination with them.

That new actual entities are determined by prior actual entities is an expression of efficient causation. But the actual entity is never fully determined by the “given” of its actual world. There is always a margin of indetermination and the necessity of decision among potentialities (Whitehead, 1979, pp. 27-28). Indeed Whitehead defines actuality as “decision amid ‘potentiality’” (Whitehead, 1979, p. 43). An actual entity, he writes, is a novel unification of many, a “creative advance”. Creative

14 Whitehead means these concepts to apply to inanimate objects as well as to living things. A more intuitive example would be that the actual worlds of the family members, while different from each other, are included in the actual world of the family—assuming that the family is an actual entity.

advance is the expression of “creativity”. “Creativity” in Whitehead’s system is the “universal of universals”, the “ultimate principle by which the many become the one actual occasion” (Whitehead, 1979, p. 21). As a metaphysical ultimate, it cannot be explained, it is simply the “principle of novelty”, inherent in the cosmos.

But there is another kind of entity, not actual. Whitehead calls these entities “eternal objects”. These are pure potentialities (Whitehead, 1979, p. 45). They are those entities that can be conceived, or “felt”, independently of the temporal world, that is, independently of all actual entities (Whitehead, 1979, p. 45). The eternal objects closely resemble Plato’s Forms, and Whitehead introduces them as such. It is by virtue of the eternal objects that creativity has potentialities for novelty (Whitehead, 1979, p. 344). Simple examples may include “redness”, “circularity”. These can be thought of with no reference to actual things, yet are potentials: actual things can be red or circular.¹⁵ Eternal objects are taken into actual entities. This taking into, analogous to Plato’s “participation”, Whitehead calls “ingression” (Whitehead, 1979, p. 23). It will be convenient to follow Whitehead’s usage and to refer to particular combinations and configurations of eternal objects as “forms”. In the process of completion of any actual entity, the eternal objects, the potentialities, are actualized. The eternal objects actualized in an actual entity give it its form; they determine “what” it is. Hence, while actual entities perform the function that substance performs in philosophies of substantial being, the eternal objects combined into form, perform the function that essence performs in those philosophies. As potentialities, moreover, eternal objects function as final causes.

But without some ordering among them, the eternal objects would constitute an arbitrary chaos of potentiality. Moreover, the ontological principle holds that

15 My examples. Whitehead’s style is highly abstract and he gives few examples in the course of *Process and Reality*.

anything that exists must be associated with actual entities: they must be somewhere. The eternal objects are not themselves actual; they find their place in the actual entity known as God, and particularly in the “primordial nature” of God (Whitehead, 1979, p. 46). I will discuss God later. Suffice it to say here that God conceives the eternal objects in a single ordered whole (Whitehead, 1979, p. 344). God’s ordering conception of the eternal objects is an act of “creativity” giving “creativity” its fundamental character (Whitehead, 1979, p. 344). The general potentiality of the universe, and its final cause, is, then, in the primordial mind of God (Whitehead, 1979, p. 46). The eternal objects in the primordial nature of God, Whitehead remarks, constitute Plato’s realm of Forms (Whitehead, 1979, p. 46).

Neither the process by which actual entities complete themselves nor the emergence of new actual entities from prior ones should be construed as occurring “in” time or “through” time. Time is rather an abstraction from the processural nature of existence. An actual entity constitutes an indivisible duration, the fact that it is analyzable into stages can be further abstracted as a sequence of instants, similarly, the process whereby actual entities lead to the emergence of novel actual entities can be abstracted as a temporal sequence. But in all cases the temporal sequence, time, is an abstraction. Whitehead goes to great lengths to avoid using the language of time (see, for example his definition of enduring objects). Similarly, actual entities do not occupy space so much as that the concept of space is an abstraction from the fact that actual entities are distinct from each other (see Whitehead, 1979, pp. 283-302).

3.2.2 *Actual entities.*

In the following it must be kept in mind that actual entities need not be conscious entities—and most actual entities, indeed, are not conscious. Though

Whitehead uses psychological terms throughout, he means them in a way that applies also to inanimate objects. A table “feels” the prehensions of the legs and top, in accordance with its “subjective aim”.¹⁶

What an actual entity is, is *how* it comes to be. Whitehead calls this the principle of process: an actual entity’s “‘being’ is constituted by its ‘becoming’” (Whitehead, 1979, p. 23). It is the process of its own becoming, but also, it is the potential of participating in the becoming of other beings (Whitehead, 1979, p. 23). In the process of becoming, it brings about the “production of novel togetherness” (Whitehead, 1979, p. 21), what I called “completion” above. Whitehead refers to this as “concrescence”: the actual entity is the process of becoming concrete. The complete or concrete form, Whitehead calls the “satisfaction”. As process of becoming, the actual entity is a “subject” creating itself in response to final causes; as complete, or concrete, subjectivity “perishes” and the actual entity becomes objective, and objectively immortal. As concrete, it loses final causation and gains efficient causation (Whitehead, 1979, p. 29). What Whitehead means is that, as complete and concrete, an actual entity continues “forever” as a causal factor, part of the “given” world.

What initiates the process that is an actual entity are “prehensions”. Those prehensions are also that which the actual entity forms into a “novel togetherness”. But they are also what the actual entity is. There is no prior actual entity that first receives the prehensions; rather the actual entity is constituted by the prehensions that it, in turn, forms into the satisfaction. The actual entity gathers the prehensions and forms them into a novel entity in terms of its “subjective aim” towards a “satisfaction”; it is a concrescence of prehensions (Whitehead, 1979, p. 23). That

¹⁶ Whitehead’s metaphysics is sometimes called “pan-psychism”. The social and psychological terms he used for inanimate processes were evidently meant as more than mere analogies.

“subjective aim” however, is derived from the prehensions as well. What is a prehension?

With caution, a prehension may be conceived as the encounter of one actual entity with another, or as the extrusion of one into another. The caution is that the one actual entity already exists, while the other is constituted by the encounter or extrusion. The term “prehension” simply expresses the fact that characteristics of existing actual entities are reproduced in a new actual entity—remembering, again that the actual entity in which those characteristics are reproduced is constituted by the reproduction. Prehensions are “vectors” of actual entities whose intersection is a new actual entity (cf. Whitehead, 1979, p. 19). Through prehension, the potentiality of one actual entity is realized in another actual entity. This realization Whitehead terms “objectification” (Whitehead, 1979, p. 23). In the receiving subject, prehensions take on “subjective form” that involves “emotion”, “purpose”, “valuation”, and “causation”: prehensions are “felt” by the subject that they constitute. That subjective form is determined by the subjective aim of that actual entity towards satisfaction.

Prehensions are initially “data”, that is, characteristics of the source actual entities reproduced, or objectified, in the subject as “physical feelings”. But those characteristics include also eternal objects. These may be drawn out, or conceived by the subject as “conceptual feelings”. Conceptual feelings are adapted to the subjective aim (Whitehead, 1979, pp. 26-27). But the eternal objects are potentialities and those potentialities are related in a total ordering in the mind of God according to God’s subjective aim. Thus, in conceptual feeling, in prehension of eternal objects, the actual entity prehends also, however dimly, the general potentiality of the universe, the final cause in the primordial nature of God (Whitehead, 1979, p. 46). Potentiality, as final cause, Whitehead terms a “lure for feeling”, “guiding the concrescence of feeling”

toward a particular form of completion, or “satisfaction” (Whitehead, 1979, p. 185). Said differently, a “lure for feeling” is anything that gives rise to “subjective aim” as the potentiality at which the actual entity aims (Whitehead, 1979, pp. 85, 87). With potentiality ordered in the primordial mind of God in terms of his subjective aim, God is “the lure for feeling,” and “the initial ‘object of desire’ establishing the initial phase of each subjective aim” (Whitehead, 1979, p. 344). God then is the principle of concretion (Whitehead, 1979, p. 345). In all of this creativity is operative, there is decision, selection, inclusion, and exclusion. If an actual entity is a movement between efficient and final cause, in the process, the movement is also creative, and self-creative, a movement into novelty, a transformation of incoherence into coherence (Whitehead, 1979, p. 25).

An actual entity arises from what is already there, the “given”, or “givenness”. That is, what is “settled, actual, and already become” (Whitehead, 1979, p. 65). The given includes prior, i.e. concrete, actual entities and eternal objects (Whitehead, 1979, pp. 42-45) and constitutes the initial “datum” of an actual entity (Whitehead, 1979, p. 65). But as such, the given is also the actual world “in its character of a possibility” relative to an actual entity (Whitehead, 1979, p. 65), that “conditions and limits the potentiality for creativeness beyond itself (Whitehead, 1979, p. 65). Givenness and potentiality refer to each other (Whitehead, 1979, p. 45): the given limits the general potentiality of the eternal objects, and the limitation renders specific potentiality, that is, real possibility (Whitehead, 1979, p. 65). When everything is potential, nothing is possible.

Initially, the given gives rise to a new actual entity in the mode of efficient cause. It is, in other words deterministic. All the way through to concrescence, according to Whitehead, everything that can be determined is determined. Yet

something always remains open to decision: the whole decides to a greater or lesser extent its own internal structure (Whitehead, 1979, p. 27). Nevertheless, only that freedom exists which is inherent in the given (Whitehead, 1979, p. 133). That suggests that the given is never wholly complete and coherent. In any case the emerging actual entity is confronted by the infinite potentiality of the forms among which it must choose (within the limits of the given). As complete, or fully concrete, the actual entity appears as fully determined, once something has become a being it could not have been otherwise, and it is then given, part of the ground for future determination. As a process of concretion, however, it appears as free (Whitehead, 1979, p. 29). We may conceive it as follows. Efficient cause brings about the emergence of an actual entity that in the course of determined emergence makes choices altering that very emergence. It does not choose arbitrarily, however, but in terms of final causes. The eternal objects function as final causes that present not a single destiny that the actual entity is compelled to follow in its choices but rather a range of potentials among which it chooses. The free movement into novelty is an expression of the ultimate principle, creativity.

That actual entities are at once determined and free, suspended, as it were between givenness and potentiality, efficient cause and final cause, is expressed in the doctrine that actual entities are “dipolar”. Actual entities, according to Whitehead have a “physical” pole and a “mental” pole. The physical pole consists in the determinate feelings of the actual world, the mental pole of “conceptual appetitions”, by which he means prehended potentialities, what goes to make up subjective aim (Whitehead, 1979, p. 45). The physical pole is “objective”, derived from the “external” world, ruled by efficient causation. The mental pole is “subjective” consisting of conceptual valuations of the physical feelings, ruled by final causation

(Whitehead, 1979, p. 277). The mental and physical are not two distinct substances, but rather integral parts of the one “substance”: actual entity. The actual entity may be said to be “composed” of the physical, determinant feelings of the actual world, but “originated” by the mental, conceptual appetitions. The mental pole achieves the subjective aim from the physical data, completing efficient cause through final cause. It evaluates and selects among the efficient causes in the process of going beyond them (Whitehead, 1979, p. 277). In short, the doctrine of dipolarity simply expresses the movement from the state of givenness to a new state of givenness as a process whereby determinism is appropriated by creativity in the pursuit of a final cause: the new state of givenness is a *novel* synthesis. Shorter yet: there is what is already given, raw material, on the one hand and there is what the actual entity does with it on the other.

What about identity over time? If existence is composed of processes arising and achieving an objectively static state while subjectively perishing, in what sense is an elderly person the same individual as the child who long since achieved concrescence and “perished”. The same question must be asked, for example, of a stone or of an atom, which Whitehead conceives as series of actual entities, continually arising and perishing. Such entities, according to Whitehead, through their prehensions, in combination with the prehensions of their actual worlds each give rise to a single new actual entity in which the same form is reproduced. But the reproduced form is such that as the new entity achieves completion and perishes, its prehensions along with those of its actual world may give rise to a single new actual entity in which that form is again reproduced. Thus there is a series of actual entities each including the same form. Such series Whitehead calls “enduring objects”

(Whitehead, 1979, pp. 34-35). It should be understood that such series need not be infinite: there is often a first and last member, birth and death.

Propositions play an important role in both science and religion, as doctrine, dogma, law, and theory. We might indeed say that the production of true theories about nature is the entire purpose of science. In religion the production of true dogmas is certainly important. In religions such as Christianity where belief is thought to be salvific, correctly formulating the dogmas that are to be believed is essential. For Whitehead, however, dogmas, theories, and the like are merely verbal expressions of propositions. Propositions as such are, for him, more fundamental entities, which the statements express more or less accurately.

A proposition, for Whitehead, is the possibility of an actual world containing a particular configuration of actual entities which exemplify a particular set of eternal objects (Whitehead, 1979, p. 186). It is a hybrid entity that associates actual entities with eternal objects hypothetically. Rather, it associates a set of possible actual entities with a set of eternal objects (Whitehead, 1979, p. 256ff). The set of actual entities are all those possible actual entities that share certain forms (Whitehead, 1979, p. 257). "All men are mortal", associates all possible actual entities, past, present, and future, that share the form of humanness, with the quality of mortality (Whitehead, 1979, p. 258). The set of possible actual entities in the proposition, Whitehead calls the "logical subjects" of the proposition.

A universal proposition is true if all logical subjects conform to the eternal object, *mutatis mutandis* for the other types of proposition. However, according to Whitehead, the truth of a proposition is less important than its interest (Whitehead, 1979, p. 257). Someone contemplating religious mythology, for example, may well not be judging their truth-value so much as allowing himself to be moved by them.

The quality of being moved may indeed dictate the judgment of their truth (Whitehead, 1979, p. 185). The function of an expressed proposition is to evoke the lure, not simply to call for a judgment of truth or falsehood, but to orient towards the environment of the proposition and towards its realization (Whitehead, 1979, pp. 25, 264-265). Propositional feelings may prompt awareness of imagined possibilities, functioning as lures to “creative emergence in the transcendent future” (Whitehead, 1979, p. 263). Propositions that are not “true” in the sense of conforming to the existing world introduce novelty (Whitehead, 1979, p. 187).

A proposition, in other words, is a possibility, and the question is whether or not the world can and should be this way, or even whether or not the world can and should move in this direction. A proposition is, then, a lure for feeling, proposing a subjective aim towards its realization (Whitehead, 1979, pp. 25, 186, 259).

But a proposition exists only for those actual entities for which the logical subjects are part of their actual world. For others it is non-existent, its expression meaningless. Those actual entities for which the proposition exists are termed the “locus” of the proposition (Whitehead, 1979, pp. 186-188). But that implies that “every proposition defines the judging subjects for which it is a proposition” (Whitehead, 1979, p. 193). Similarly, a proposition requires (or implies) an actual world, a “systematic environment” (Whitehead, 1979, p. 258).

We discuss Whitehead’s concept of God, not only because of our interest in religion, but also because God is an essential part of Whitehead’s metaphysics. As in other metaphysical systems, the God of Process Philosophy is a particular rational and abstract construct requiring specification beyond such simple formulas as “the God of Abraham”.

God, in Whitehead's system is an actual entity.¹⁷ Like other actual entities he is dipolar, but his dipolarity consists not in physical and mental poles, but in primordial and consequent natures.

The primordial nature of God is the totality of eternal objects gathered into a single unifying conception (Whitehead, 1979, p. 44). Or, equivalently, it is his conceptual "realization of all potentiality" (Whitehead, 1979, p. 343), an ordering of potentiality in terms of his subjective aim (Whitehead, 1979, p. 344). The primordial nature of God, then, gives meaning to the world and everything in it; in Whitehead's words, God "is the lure for feeling, the eternal urge of desire" (Whitehead, 1979, p. 344). God, then, in his primordial nature, determines the range of what is possible (which may well be infinite) and also a universality of aim towards actualizations of the possible, that is, towards orderings of the world that actualize the primordial mind of God. The general potentiality of the universe then appears as final cause; that is, the mind of God appears in its "proximate relevance" to actual entities (Whitehead, 1979, p. 46). God is, then, relevant to every creative act, the "initial phase of each subjective aim" (Whitehead, 1979, p. 344), and thereby, God is the principle of concretion (Whitehead, 1979, p. 345). Said differently, and, perhaps more simply, God's primordial nature imparts direction, meaning, and coherence to the multiplicity of subjective aims of the multiplicity of actual entities.

The primordial nature of God is not actual in Whitehead's meaning of the term, but only potential. In keeping with the ontological principle, God can exist only as an actual entity and thus in relation to other actual entities. The actuality of God consists in his consequent nature (Whitehead, 1979, p. 349), which Whitehead characterizes as "immediate fact" and "unresting advance beyond itself" (Whitehead,

17 Other actual entities are temporal and thus may be termed "actual occasions" as well as "actual entities". God, however, is eternal, and thus an "entity" but not an "occasion". This particular distinction is not germane to my argument.

1979, p. 350) and as God's completion in "fullness of physical feeling" (Whitehead, 1979, p. 345). This seems almost a reversal of the process of other actual entities in which physical feelings come "first" and the conceptual feelings are derived from them. In God the primordial nature is purely conceptual yet is prior to the physical feeling. Said differently, God would appear to be pure potentiality seeking actualization, while other actual entities would appear to be given actuality seeking potentiality for novelty. In *Process and Reality*, Whitehead (1979, p. 345) writes that in ordinary actual entities physical experience moves toward completion motivated by conceptual experience derived from God; In God, on the other hand, conceptual experience moves toward completion motivated by physical experience derived from the world.

The consequent nature of God is the movement from the primordial nature toward the final unity of actuality with the primordial concept; but that final unity is achieved through the multiplicity of free actualizations in the temporal world (Whitehead, 1979, p. 346). But that means that God's actualization depends in some respect on the progress of the ordinary world. "The perfection of God's subjective aim [...] issues into the character of his consequent nature" (Whitehead, 1979, p. 345). The perfection of God's subjective aim, then, is the work of the ordinary world. His consequent nature is, in some sense, the actual world, and therefore "consequent" upon it. But the actual world is motivated, or "lured" by the primordial nature of God

On the other hand, the actual world is realized "in the unity of [God's] nature, and through the transformation of his wisdom" (Whitehead, 1979, p. 345). The actual world and God's consequent nature, from this point of view, are the work of God who gathers up the sum total of physical experience and integrates it with his primordial nature, his conception of the whole (see Whitehead, 1979, p. 345). Again: the

consequent nature of God is the “reception of the multiple freedom of actuality into the harmony of his own actualization” (Whitehead, 1979, p. 354).

God is actualized by the world and the world is realized in God. Creation is not *ex nihilo*, by fiat of an unmoved mover; rather creation is more like a partnership between God and all other actual entities.

Whitehead now sketches out his notion of how the consequent nature of God is structured—or from our temporal point of view, the structure toward which it (and the world) aims. In the consequent nature, all things are harmonized by God’s subjective aim; all things, both good and evil are given their place (Whitehead, 1979, p. 346). Whitehead writes that God “saves” the world meaning that in his consequent nature, nothing is lost that *can* be saved; much that is thought to be evil, he notes, such as heresies and rebellions, has its function in advancing the human spirit (Whitehead, 1979, p. 346). In this context Whitehead writes that God is “tender” in preserving all that becomes, and “patient” in allowing the actual world to work out its harmony with the primordial vision. God is the “poet of the world” (Whitehead, 1979, p. 346).

By “preserving” or “saving” Whitehead also means that in the consequent nature of God, whatever has become remains “everlasting”. Whatever has been, the “past” remains forever immediately present: there is “no loss” (Whitehead, 1979, p. 346). As things stand in the actual world as we experience it, novelty, creative advance, necessarily involves selection and elimination. This difference between the actual world and the consequent nature of God gives rise to what Whitehead says is the religious problem: the possibility in the ordinary world of an order in which novelty in the emergence of new actual entities “does not mean loss” (Whitehead, 1979, p. 340). According to Whitehead, then, the religious vision is of an all

embracing, all-inclusive harmony which nevertheless remains dynamic—ever new, while fully retaining what has been.

3.3 Religion

Religion is the vision of something which stands beyond, behind, and within, the passing flux of immediate things; something which is real, and yet waiting to be realized; something which is a remote possibility, and yet the greatest of present facts; something that gives meaning to all that passes, and yet eludes apprehension; something whose possession is the final good, and yet is beyond all reach; something which is the ultimate ideal, and the hopeless quest. (Whitehead, 1967, p. 191)

In the previous chapter I proposed a brief definition of the Christian religion with which, I trust, most would agree, except for the admitted fact that it is incomplete, and perhaps over-general. In this section I attempt to define religion from the point of view of process philosophy, in particular, as understood by Whitehead himself. I rely primarily on two sources, *Religion in the Making* and *Science and the Modern World*, both published a few years before *Process and Reality*, while taking hints from *Process and Reality*.

Whitehead did not write nearly so much on religion as such as he did on science. Indeed, although Whitehead gives a great detail of attention to his concept of God he has not, to my knowledge given comparable attention to the question of religion. The above quotation, what he conceives to be the “essential character of the religious spirit” (Whitehead, 1967, p. 191) indeed devotes only three words to religion

as such: “Religion is the vision...” the remainder of the quotation is devoted to the object of the vision, presumably God. He offers a rather confusing welter of definitions, mixed with speculations on the origins of religion. His various definitions, however, seem to fall into two broad categories: the existential and the epistemological. The existential definitions understand religion, roughly speaking, as the response of humanity to God. The epistemological definitions understand religion as knowledge and the pursuit of knowledge about the cosmos. As we shall see, the existential definition seems to be more fundamental for Whitehead (Whitehead, 1967, p. 192), but he typically writes of religion as if it were constituted by the pursuit of knowledge. This is natural enough given Whitehead’s personal interests.

Religion in the Making begins with speculations as to the origins of religion. This provides us with a descriptive social-historical scheme as a context within which to situate Whitehead’s existential and epistemological understandings.

3.3.1 *Religion as social-historical movement.*

In *Religion in the Making*, Whitehead proposes a series of stages in the development of religion, the most advanced form being “rational religion”. His principle examples of rational religion are Christianity and Buddhism. We need not here be concerned with the accuracy of either his historical account or of his understanding of Buddhism and other non-Christian religions.

His historical stages of religious development are useful categories for describing religion. These are ritual, emotion, belief, and rationalization. Ritual, he maintains, generates emotion; beliefs justify and explain the rituals and emotions, typically through myths, for example of heroes of the foundational past. Beliefs, in turn inspire ritual and emotion, while emotion vivifies ritual and belief. The three

form a mutually reinforcing complex. Rationalization, on the other hand, is the effort to bring ritual, emotion, and belief in to a coherent whole based on universal principles. Without rationalization, ritual, emotion, and belief tend to be tribal, communal, social (Whitehead, 1926, p. 6): it is the group, not the individual, that approaches the sacred in the frenzy of the dance. In such “communal religions” goodness is what is good for *us* as opposed to *them* (Whitehead, 1926, p. 10) and God tends to appear under the “barbaric conception” of a tribal champion, supreme ruler, or glorious tyrant (Whitehead, 1926, p. 14). On the other hand: “Rational religion,” he writes, “is the wider conscious reaction of men to the universe in which they find themselves” (Whitehead, 1926, p. 11). It goes with “world-consciousness” (Whitehead, 1926, p. 10). That means too, the universalization of goodness: the same rules of valuation apply to everyone irrespective of whether they are near or far, “we” or “they” (Whitehead, 1926, p. 10). But universality, then, implies a disconnection from one’s immediate surroundings; hence it is individualizing and the religious experience is driven inward, into solitariness (Whitehead, 1926, p. 12). Indeed Whitehead is led here to assert that, “Religion is what the individual does with his solitariness” (Whitehead, 1926, p. 12). Salvation is now for the individual alone, not for the group (Whitehead, 1926, p. 9).

Rational religion, it is important to note, does not dispense with ritual, emotion, and belief. Rather it universalizes them, reinterpreting them so as to apply to all. With his typical focus on religion as knowledge, he writes that “imaginative representations of spiritual truth”, that is myth and the like, are necessary (Whitehead, 1926, p. 41), though he also insists that the message must be disengaged from outdated “popular imagery” and “adventitious notions” (Whitehead, 1967, p. 189). Whitehead gives no examples, but we may speculate that he would agree that with

rationalization, the Biblical creation myth becomes the story of the creation and fall of *humanity*, not just of the tribe; that the crucifixion becomes the redemption of *all*, not just of the Jewish people; and that the rite of communion is a commemoration of that crucifixion available to *all* who believe. In a definition that brings together the existential and epistemological aspects of religion, Whitehead writes:

Rational religion is religion whose beliefs and rituals have been reorganized with the aim of making it the central element in a coherent ordering of life—an ordering which shall be coherent both in respect to the elucidation of thought, and in respect to the direction of conduct towards a unified purpose commanding ethical approval. (Whitehead, 1926, p. 7)

3.3.2 *The Existential interpretation.*

Whitehead understands religion as a social institution that is also a fundamental human activity bringing together, or “harmonizing” individual solitude with the objective universe. That activity is “worship” in response to the vision characterized in the opening quote above, “Religion is the vision of something which stands beyond, behind, and within”. That response is the mutual working out, and reaching for, harmony and integration: of the solitary self with other selves, with community and with the cosmos (cf. Whitehead, 1926, pp. 15, 16). The “vision” appears to be equated with an encounter with God: “Religion is the reaction [to the] search for God” (Whitehead, 1967, p. 191); “The vision [...] is always there, and it has the power of love presenting the one purpose whose fulfillment is eternal harmony” (Whitehead, 1967, p. 192). That reads like a short summary of Whitehead’s concept of God (Whitehead, 1926; Whitehead, 1979). The “vision” does not seem to

include a personal God, but Whitehead insists that the doctrines of the major representatives of rational religion agree that God is never directly experienced as a person (Whitehead, 1926, pp. 17-18).

“The vision claims nothing but worship; and worship is a surrender to the claim for assimilation”. Whitehead writes in *Science and the Modern World* (1967, 192). In *Religion in the Making* (1926, p. 16) he writes that the religious experience is a merging of one’s solitary claim with the universal claim of the objective universe. In that act, the “character” of the universe is encountered: an inherent “rightness” that “modifies both efficient and final cause” (Whitehead, 1926, p. 16). This suggests that for Whitehead, the core of religion is worship, both corporate and individual, understood as an encounter with and response to God. God, as we have seen, is understood as the active principle of the cosmos which both imparts existing order (i.e. efficient cause) and purpose towards fulfilled order (i.e. final cause). We may say, using language not characteristic of Whitehead, that religion is response to the call to harmony, a call which is itself transcendence reaching for harmony with immanence.

It must be emphasized that Whitehead does not understand religion as conformity to a pre-established eternal order. The cosmos is not, for him, a hierarchy of fixed substances arranged—or pre-destined for arrangement—under a fixed and eternal unmoved mover, or, supreme substance. Rather the cosmos is more of a work in progress, a movement into novelty and ever-novel forms of complex harmony, in which God is an essential partner rather than sole designer or fixed foundation. Even the order at which the divine purpose aims, is not fixed, but dynamic, an ever new emergence into novelty. Hence, religion, worship, is participation in that work: “surrender to the claim for assimilation” means participating in the work of bringing

about harmonies, *with* God, and out of our own freedom and creativity, rather than blindly adopting assigned roles.

3.3.3 *Religion as epistemology.*

Whitehead typically speaks of religion not as a response, worship, or participation, but as a search for knowledge: “religion is the expression of one type of fundamental experiences of mankind [...] religious thought develops into an increasing accuracy of expression” (Whitehead, 1967, p. 190). In the context of discussing worship as response to the “vision” (see above), for example, he seems to say the purpose of ritual is to evoke an “apprehension of the commanding vision.” That is, as an instrument of knowledge rather than as a mode of response. His overriding interest in science, and in the relations between religion and science would seem to explain this emphasis. In *Religion in the Making* (1926, 15) he goes so far as to maintain that religious dogmas are “exactly” like scientific theory, in that they are attempts to formulate experience in precise terms. Even when he acknowledges that formulaic abstractions cannot express all our knowledge (Whitehead, 1926, p. 40) and that dogmas only contain “bits of truth” (Whitehead, 1926, p. 41), the focus is on knowledge—there are things we can *know* but not articulate—not on action, worship, or response.

In *Religion in the Making*, he devotes a good deal of attention to the importance, and limitations, of dogma. Dogmas are “true” he maintains, to the extent that they adequately formulate the facts of religious experience (Whitehead, 1926, p. 38). Dogma is interpretive of both personal experience and of the important events and personalities in the history of the religious community. The interpretation universalizes the experience in terms of precise statements of general truths

independent of particular circumstance (Whitehead, 1926, p. 35). Through dogma, then, religious experience is rescued from the transitoriness of momentary emotion and given universal significance (Whitehead, 1926, p. 38). More: “dogmas are statements of how the complex world is to be expressed in the light of the intuitions fundamental to the religion” (Whitehead, 1926, p. 39). As interpretations, in other words, dogmas aim to be all embracing.

We may surmise from this that dogma is one instrument of the “rationalization” of religion. Communally shared rites and myths interpreted in terms of general principles, that is, expressed as dogma, are thereby understood as rites and myths of humanity, and perhaps beyond. While they may continue to reaffirm the community, they also open the community to the world; the associated emotions are no longer the ecstatic submersion of identity in the community, but universal feeling. Again, however, universalization is individualizing. When the feelings of worship are understood as universal they can no longer be local, and the individual emerges from communal ecstasy into personal solitude.

But Whitehead also understands dogmas as expressive and as evocative. Dogmas not only interpret, they also give expression to the decisive events, lives, and experiences of the religion—but in a way that lifts those events from the particularity of their time and place making them relevant for all (Whitehead, 1926, pp. 37-39). But those expressions, in their proper function, also call forth and support corresponding religious experiences among the faithful. Precise expressions, he maintains, are conditions for realization and apprehension (Whitehead, 1926, p. 35). Dogma is thus “an aid in the difficult task of spiritual ascent” (Whitehead, 1926, p. 38).

As interpretation, expression, and evocation, dogma is communication, a medium whereby the religious experience is shared in call and response. It is the public form of private experience, evoking comparable experience, and subsequent expression in others. In a word, dogma is conversation. Dogma provides a pathway from the individuality of solitude to the publicity of the universal, and back again: “what is known in secret must be enjoyed [...] and verified in common. The immediate conviction of the moment [...] justifies itself as a rational principle enlightening the objective world” (Whitehead, 1926, p. 38). As expression and evocation, then, dogma is part of religion understood existentially, part of the call and response to the “vision”.

But if dogma is conversation then we would not expect it to be fixed once for all. A conversation in which the same words are spoken again and again without variance is hardly a conversation. Whitehead is clear on this. Dogmas are and must be alterable. They tend to lose the power to evoke the fundamental religious experience, and when they do, they stifle rather than foster religious life (Whitehead, 1926, p. 38). That loss of power happens, in part, because, dogmas express their truths in narrow and limited forms (Whitehead, 1926, p. 41). In other words, the attempt to give religious events and experiences a universal form of expression is always imperfect. Religious thought, and hence dogma, according to Whitehead develops over time, an “increasing accuracy [...] disengaged from adventitious imagery” (Whitehead, 1967, p. 190). This suggests that myths that were once thought to be universally true may be found to have been only artifacts of a particular time and place, irrelevant or misleading at other times and places. A dogma, like any form of expression, is formed in a social-historical-linguistic context. The dogma presupposes that context, having its meaning and truth in that context. The relations among the totality of words in the

language changes; the set of assumed concepts changes. But it is in terms of the relations among words and a set of assumed concepts, that any one statement has meaning and truth-value. The cultural connotations of words and images change as well. The same dogma then can come to mean something quite different. Whitehead suggests, as an example, that referring to God as “Father” may depict God as stern in some cultures and tender in others (Whitehead, 1926, p. 36). Moreover, a dogma cannot be more adequate than the terms employed, but a dogma, even if true, “does the work of falsehood” when used to suppress other modes of thought (Whitehead, 1926, p. 36). At times, then, not only may more adequate terms be found, but also should and must be found. Whitehead points out that in the history of the Christian Church, dogma has in fact undergone alteration over the two millennia of its existence (Whitehead, 1967, p. 183).

Besides their necessary alterability, Whitehead insists that dogmas are necessarily incomplete. They are only “bits of truth” (Whitehead, 1926, p. 41). On the one hand, we cannot know everything. On the other, there is much that we can know but that cannot be systematically articulated (Whitehead, 1926, p. 40). But the sources of religious belief, according to Whitehead, are always growing (Whitehead, 1926, p. 41), hinting that what we could not know or formulate previously, may now be available for dogmatic formulation.

To summarize, Whitehead holds dogma to be interpretive, expressive, and evocative. In all of these aspects it is a necessary feature of religion. At the same time, dogma is necessarily incomplete and its message is at least partly contextual, depending on a particular time and place. In order to perform its functions, then, dogma is necessarily alterable.

3.3.4 *Process interpretation.*

To my knowledge, Whitehead supplies no interpretation of religion in Process Philosophical terms. I shall attempt such an interpretation here, based on the above discussion. I take as the actual entity that constitutes religion the “act of worship”, corporate or individual.¹⁸ I mean by “act of worship” any response to the vision described by Whitehead in *Science and the Modern World*, or, in other words, “worship” is response to encounters with God, and religion is the sum total of such acts, both as series and as nexus. Worship, in this sense is not restricted to religious services, prayer, and the like, but would also include any action, such as acts of social service, carried out religiously, that is, as responses to encounters with God.¹⁹ What is “given” in every act of worship includes established ritual, beliefs, and myths, dogmas, as well as the personal histories of the participant persons and institutions. The emotion attending acts of worship would then be the complex unification of prehensions of those “givens” with prehensions of the encounter with God, in his primordial and consequent natures. Informed and motivated by the potentiality of the primordial nature of God, the act of worship in its concrescence participates in the consequent nature on God. That is to say, it takes its place in the ultimate dynamic harmony of God’s actualization in the world (cf. Whitehead, 1979, p. 346).

It will properly be objected that this characterization of the act of worship as an actual entity would apply to every actual entity, except for differences in the “givens”. After all, the “proximate relevance” of the primordial nature of God is operative for all actual entities, imparting final cause to all (Whitehead, 1979, p. 46); thus all acts are “responses” to “encounters” with God participating in the universal

18 Obviously, religion, with its many congregations and many sects must be considered as a nexus of entities, each of which consists of a series of actual occasions. For simplicity I shall write of religion as if it were a single series of actual occasions, keeping in mind the abstraction of such a usage.

19 There is no reason that scientific research, for example, might be, and probably is, carried out in this spirit, and would therefore be considered acts of worship by my definition.

concrescence (Whitehead, 1979, pp. 45-46). I think Whitehead would differentiate religion from other actual entities not only on the basis of the “givens” but also in the quality and scope of its encounter with and response to God.

The religious problem, Whitehead writes, is the possibility of a world order in which new entities are formed, but in which, “novelty does not mean loss” (Whitehead, 1979, p. 340). The religious vision, then, is of an all embracing, all-inclusive harmony which nevertheless remains dynamic, ever new while retaining all that has been. Religion he writes elsewhere, is the “translation of general ideas into particular thoughts, particular emotions, and particular purposes” and of infusing “non-temporal generality” into the “insistent particularity of emotion”. Again in, to some extent, all actual entities do this, but acts of worship do so explicitly: they are self-conscious responses to the vision of God *as such*. Religion is, he writes in *Process and Reality* (1979, p. 349):

The story of the dynamic effort of the world passing into everlasting unity, and of the static majesty of God’s vision, accomplishing its purpose of completion by absorption of the world’s multiplicity of effort.

We cannot claim that in any act of worship, either the religious vision or the response to it are full, but that they strive toward fullness; that they aim for the fullness of God’s all inclusive vision of harmony and they aim for the full actualization of that vision—in other words, the act of worship unreservedly participates in God’s act of self-actualization. If the primordial nature of God is the “eternal urge of desire” relevant to every creative act, and the “initial phase of each subjective aim” (Whitehead, 1979, p. 344), worship is motivated by the fullness of

desire for God (in his primordial nature) and if God (in his consequent nature) is the “Realization of the actual world in the unity of his nature, and through the transformation of his wisdom,” then worship is the unreserved act of actualization, as it were bodily gathering up the world and offering it to God. If God is the “poet of the world [...] leading it by his vision of truth, beauty, and goodness” (Whitehead, 1979, p. 346), worship is the creative and self-conscious enactment of the poem.

The act of worship, then takes the primordial nature of God as its own potentiality, God’s subjective aim as its own, and, in its concrescence brings the entirety of *its* actual world to eternal being in the consequent nature of God. But its actual world includes its own “previous” acts of worship, reproducing the essential form in an enduring object, so that the many acts of worship in its history (which may span many human lifetimes) appear as one act, and the many actual worlds of that history appear as one. Religion, then, is, or strives to be, that nexus of actual entities that binds up the world and offers it to God, who in turn transforms it in the harmony of his consequent nature.

I understand the work of theology, the pursuit of knowledge of God and the world, as an act of worship. To focus on dogma: dogma as interpretive is part of what is given in acts of worship, prehending the specific act as an unalterable condition, felt, perhaps, as faith. As expression, it is what was given, transformed by subjective aim as apprehended in and appropriated from God, in *this* act. The words may not, usually do not, change, though the understanding may change. Even the understanding of a dogma may not change—yet expressed in or as an act of worship, the understanding is new, a creative advance into novelty. As evocative, the dogma, calls forth a conformity to the subjective aim of God which it expresses.

In expression, dogma belongs to the concrescence of an act of worship, part of the decision that gives it its “satisfaction”. Having been expressed, the dogma joins the ranks of the given, prehending new acts of worship in the mode of efficient cause. Being heard, the prehended dogma is transformed by subjective aim and takes the role of a final cause: it becomes evocative. It should go without saying that a dogma uttered long ago and functioning as a given may be apprehended as a living expression and function as evocation.

Dogmas are verbal expressions of propositions. We recall here that a proposition is a potentiality: the potentiality that specified sets of actual entities, logical subjects, might be characterized by certain general qualities, or, said differently, a proposition associates certain pure potentialities with certain actual entities (Whitehead, 1979, p. 186). The proposition exists only for those actual entities for which the logical subjects are in their actual worlds. Whitehead writes that whether or not a proposition is interesting is more important than whether or not it is true (Whitehead, 1979, p. 257). I suggest that a significant part of interest is possibility: could a particular proposition that is not actualized in the world come to be so actualized; could a particular untrue proposition become true? Indeed, Whitehead indicates that propositions that are not presently “true” introduce novelty into the world (Whitehead, 1979, p. 187). A proposition is a “lure for feeling” (Whitehead, 1979, p. 185) a final cause toward concrescence and “creative emergence in the transcendent future” (Whitehead, 1979, p. 263). The function of an expressed proposition is to evoke the corresponding propositional feeling; that, in turn includes implicit reference to the actual world of the proposition and the situation in which it is uttered (Whitehead, 1979, pp. 264-265). The purpose of an expressed proposition,

then, is to orient the subject toward the world in a certain way, imparting to it a certain kind of subjective aim.

What sorts of propositions do dogmas, as acts of worship, express? In Whitehead's system the general potentiality¹ of the universe is in the primordial mind of God (Whitehead, 1979, p. 46). We may suppose, then first, that God in his primordial nature and the world together constitute a proposition, as it were the ultimate lure for feeling. Second, we may suppose, that God, in his consequent nature constitutes the "creative emergence in the transcendent future" of the all-inclusive harmony of God's subjective aim. That is to say: the becoming true of the proposition. Given our prior discussion of religion and dogma, I would like to suggest that dogmas are partial verbal expressions of the ultimate proposition of the all-inclusive harmony. As such, their purpose would be to orient acts of worship toward the realization of that proposition, towards the "lure" of God. But also, as such, dogmas could be wrong. We would expect them to be imperfect expressions of propositions imperfectly felt. Moreover, since they are tailored to particular places and times, they may become less nearly perfect as the times and places of their expressions change. On the other hand, we would expect, as act of worship succeeded act of worship, that the propositions may come to be more perfectly felt and more adequate expressions found and greater realizations of the proposition achieved. In this case the formulation of dogma, and similarly theology in generally, would come to approximate the ultimate propositions more and more closely.

But if the purpose of dogma is to orient the worshiper towards God's subjective aim, then it would seem that one purpose of ritual and belief would be to bring worshipers into the locus of the propositions expressed by dogma. That is, ritual and belief bring the logical subjects of the propositions into the actual worlds of the

worshippers. In the rite of communion, for example, the crucifixion and resurrection of Christ become actual entities for the communicant—or, equivalently, in acting out the myth the communicant enters into the actual world of worship in which God and World-as-fallen are actual entities. In this example, too, redemption is acted out as a real possibility, and hence the rite is an enactment of the entire proposition.

3.4 *Science*

Much of Whitehead's writings about science are not descriptions of what science is so much as critiques of the presuppositions of contemporary science and prescriptions as to how those presuppositions should be changed. He writes very little about scientific methods and the activity of science; rather, in critiquing the presuppositions of science he is proposing a philosophy of nature, and a general metaphysics. A metaphysics of nature is nevertheless important, as nature is science's subject matter and the general outlines of what nature is should help to determine the epistemology appropriate to exploring it.

In exploring the relation between science and religion, accordingly, we might compare and contrast the metaphysical presuppositions of each—as they are and have been and as Whitehead thinks they should be. However, such an approach may easily make us guilty of misplaced concreteness, taking the abstractions of metaphysics, themselves abstracted from the full reality of science and religion, as adequately modeling science and religion themselves. Giving a process view of the relation would seem rather to require an understanding of science and religion as actual entities, that is as events, as activities, of which their metaphysics form only a part. I therefore begin with a discussion of scientific methodology followed by a discussion

of the metaphysics of science. I then construct a process definition of science as an actual entity.

3.4.1 Scientific method.

In Chapter I science as described as the effort to understand the world through the construction of mutually consistent laws and theories that explain objective, that is, public, empirical phenomena, and that enable accurate prediction of objective, empirical phenomena. Proposed laws and theories are subject to empirical attempts at verification and falsification, but even after a consensus of scientists come to accept a law or a theory, it remains tentative, subject to future falsification. The world that science seeks to understand is the sum total of that which is public, empirical, repeatable, and rational.

Whitehead would, I assume here, not object to that characterization, except that it is excessively general and lacks detail. How would Whitehead refine it?

Science, Whitehead writes in “The Organisation of Thought” (Whitehead, 1929, p. 154), is a way of thinking, a certain type of “organization of thought”. It requires exactness, a “habit of definite exact thought” and “of looking for an exact point and of sticking to it” (Whitehead, 1967, p. 12). Science is motivated by theoretical and practical goals (Whitehead, 1929, p. 154). Science seeks to understand through the construction of theory, but it also seeks the power to bring about results, the power to effect. Whitehead refuses to give greater importance or status to either the practical or the theoretical motivation (Whitehead, 1929, p. 154). However, although the individual scientist may well be motivated by the desire for the power to effect, for example in searching for the cure for a disease, it is the theory that gives the power. I would suggest then, that in the activity of science as such, the pursuit of

theory is prior to the pursuit of practical goals. Science then, is the formulation of true propositions about nature that empower prediction and control of natural events.

Whitehead writes (Whitehead, 1967, chap. 1) that science is anti-rationalist, where “rationalism” is the medieval faith that truth could be deduced by thought alone from ultimate principles intuited from self-evidence, scripture, and the like. Partly the “anti-rationalism” of science simply indicates empiricism; it also indicates that science is concerned with fact not with meaning. Galileo, he writes, was concerned with “how things happen”, his opponents with *why* (Whitehead, 1967, p. 8). Science, then, requires stripping the things of nature of their symbolic functions (Whitehead, 1967, p. 13). Whether the earth or the sun at the center was for Galileo a question of fact, for his opponents, the heavens, the spheres, were the site of the eternal, the perfect, the sacred. For Galileo, imagining the sun at the center was simply to imagine a physical arrangement that best accounted for empirical measurements. For his opponents, imagining the earth in orbit, in its own “sphere” as it were *in* the heavens, brought the heavens down to earth and destroyed the distinction between high and low, between the sacred and the profane. In this connection, Whitehead makes the interesting observation that science requires “an active interest in the simple occurrences of life for their own sake” (Whitehead, 1967, p. 13). That is to say that science is not interested in the sacred, the eternal, the perfect, but in the profane and temporal, the imperfect world of experience. In other words, science refuses to leap from the sense experience of phenomena to their supposed deeper (or higher, etc.) meanings, but doggedly keeps its gaze on the pedestrian phenomena themselves. Its great interest is in immediate events (Whitehead, 1929, p. 155).

Nevertheless, science has its own articles of faith, rarely articulated as such. In particular, science depends upon the “instinctive faith that there is an Order of Nature

which can be traced in every detained occurrence” (Whitehead, 1967, p. 4). If it is motivated to formulate the rules by which events occur (Whitehead, 1929, p. 155) then it must maintain the faith that such rules exist. Other articles of faith that Whitehead discusses include faith in the validity of induction and faith in the metaphysics time-space-matter derived from Isaac Newton’s *Principia*. I will address these presently.

Science is empirical. It is concerned with the deliverances of sense perception but not with thought about sense perception or even with sense awareness itself (Whitehead, 1964, p. 3, 4). What he means is that the natural sciences takes nature as independent of thought, its processes being the same whether or not they are thought about. Or: “in sense perception, nature is disclosed as a complex of entities whose mutual relations are expressible in thought without reference to mind, that is, without reference either to sense-awareness or to thought” (Whitehead, 1964, pp. 4-5). Science proceeds, according to Whitehead by abstraction from sense experience, and as we have seen, the fundamental concepts of science—time, space, and matter—are themselves abstracted from sense experience. Again, abstraction for Whitehead means simplified, or lifted out of context. We attend to relations simple enough for us to understand, for example, shortening time durations and reducing extents of space (Whitehead, 1929, p. 191). In science that process of abstraction led to instants of time, points of space, and particles of matter. Such extremes of abstraction may seem oversimplification, but they allowed science to consider the most simple first, the “widespread habits of nature” that dominate the world of our observations (Whitehead, 1938, p. 154). Abstraction also means ignoring, or excluding, and every particular science excludes all but the field of its own interest, thus considering only part of the full pattern of which its field of interest is a part (Whitehead, 1938, p. 143).

For all its abstraction, however, the entities of science are real things in nature. They are abstract in that they are considered with less than their full natural context. Taking them to actually exist independently of the complex relations of nature, however, would be meaningless (Whitehead, 1964, p. 173).

Whitehead makes the further point that science is quantitative. It does not really explore the relations among entities so much as it explores the relations among measurements of physical quantities, such as mass and velocity. The scientist does not simply look at things, as Francis Bacon imagined he would, so much as he measures them and examines the quantities (Whitehead, 1967, pp. 41-43).

The quantification and mathematization of the world would seem to be of a piece with sciences aim of picturing a “neat, trim, tidy, exact world” (Whitehead, 1929, p. 158). The actual complex of experience that is the subject matter of science is “untidy”, “ill adjusted”; in it there are no precise objects at precise instants and points (Whitehead, 1929, pp. 157-158). The strict lawfulness of nature is then another abstraction from experience. Whitehead writes in *Modes of Thought* that “the laws of nature are large average effects which reign impersonally” (1938, p. 21), a theme he reiterates in many of his writings. In the passage just cited he contrasts laws of nature with actual particular things, which are specific in themselves and in their expression, the anti-thesis of average. He is also referring to the fact that the data of scientific measurements rarely, if ever, perfectly match the laws that they purportedly verify. If one plots the measured velocity of a falling object at intervals of time, the resulting cloud of dots on the graph only approximates the parabola predicted by Galileo’s equations. Whitehead seems to suggest that the variance between data and law is not only the result of measurement errors, but that there is actual variance in nature, giving room for indeterminism and for choice (Whitehead, 1979, p. 27ff).

Alternatively, possibly equivalently, variance may be the effect of factors that were excluded in the abstraction that yielded the items of interest (Whitehead, 1938, p. 143).

The extreme abstraction and consequent narrowness of focus leads the physical sciences to ignore value (Whitehead, 1929, p. 180) and to understand the world as the “mere agitation of things agitated” (Whitehead, 1938, p. 8).

Scientists formulate and test laws and theories through the examination of experience through a process of induction. Whitehead defines induction as the prediction that some feature of one specific event must also be true of certain other events separated in time or space (Whitehead, 1967, p. 44), or again, “reasoning from the sample to the whole species” (Whitehead, 1967, p. 23). For example the velocity of a falling object in a vacuum has been measured to be directly proportional to the square of the time that it has been falling—in specific actual instances. To articulate that as a law of nature is to say that the measured relation between time and velocity always will, and always has, obtained for all objects falling in a vacuum. The leap from specific instances to all possible instances is induction. A problem that plagues philosophers of science is: what is the epistemological justification for the leap from a few measured instances to a law that applies to the infinitude of possible instances? No solution has been found, though the leap of induction feels intuitively valid and has served science well so far. Given that, according to Whitehead, induction cannot be justified in the context of Newtonian space-time, science has been founded on faith (Whitehead, 1967, p. 51).

3.4.2 *The metaphysics of science.*

Science, in Whitehead's view, addresses topics and realms about which all can agree, and *therefore* excludes metaphysics (Whitehead, 1929, p. 180). Or rather, science avoids discussing metaphysics, for as Whitehead has shown, science assumes a metaphysics, and could not function otherwise. The problem of induction makes the point. The scientist observes a situation then uses reason to construct a general description. What informs his reason is his assumed metaphysics. Fundamental features of that metaphysics, as we have seen, have included an infinite uniform space composed of dimensionless points, an infinite uniform time composed of durationless instants, and particles of matter that traverse the dimensions of space and time. That is the specifically Newtonian formulation, but it is also an instance of Aristotelian metaphysics where the particles of matter appear as substances with location in space and time among the accidents that qualify them. The assumed metaphysics of science also includes the reality of causation, that every event follows upon prior events in accordance with general principles (Whitehead, 1967, p. 12). The belief in the rationality of existence, that is, of the rule of general principles, Whitehead suggests, is a legacy of the medieval belief in the rationality of God together with His omnipotence down to the finest detail (Whitehead, 1967, p. 12). The epistemology of science, however, permits only those principles that are empirically verifiable. Here problems appear. Hume has shown that there is no empirical experience of causation; if he is correct, then causation is an assumption, an article of unsupported faith (Whitehead, 1967, p. 4). More: if the cosmos is composed of points and instants, there is no necessary reference of any moment of time to any other and no justification for inferring future (or past) events from present observations (Whitehead, 1967, p. 51). The assumed metaphysics of science thus contradicts its epistemology, and indeed

appears as a logically random juxtaposition of assumptions. Hume's demonstration, as we have seen, is a form of what Whitehead called the bifurcation of nature, the belief that what we perceive is only the imprecise and imperfect appearance of what is real. That bifurcation, whose roots may be found in the ancient Greeks distinction between appearance and reality, was convenient in that it permitted the claim that Newtonian space, time, and matter were fundamental reality even though we do not experience the world as a uniform extension of points and instants traversed by particles.

Still the Newtonian view held virtually unchallenged within science until early in the twentieth century, and for all its philosophical weakness was the foundation for extraordinary advances in the physical sciences.

But there is another set of problems with the metaphysical presuppositions of science. Whitehead writes that success in science would mean the formulation of empirical laws of the universe such that our actual lives were part and parcel of that universe (Whitehead, 1929, p. 157). This is manifestly not the case. In *Modes of Thought*, for example, Whitehead notes that the physical sciences find no aim in nature (the orbiting of the planets, for example, signify nothing), yet the human world depends on aim, motivation, and the like. To the extent that science insists that there is no aim in nature, it perforce removes the human from it. This, according to Whitehead is insupportable (Whitehead, 1938, pp. 155-156). Similarly, to the extent that science insists that what is metaphysically real is a neat and tidy realm of ideas and abstractions, the messy world of actual experience, and of actual human beings is excluded (Whitehead, 1929, p. 158).

Both sets of problems are the consequence of abstraction. Abstraction entails exclusion, and hence incompleteness (Whitehead, 1938, p. 143). The Newtonian metaphysics may not have been wrong, then, but rather incomplete. Science ignores

that which is outside its field of interest, thus getting an incomplete view. Due to that incompleteness, it may encounter phenomena within its field that are inexplicable within that field. Explanations may be possible, however through widening the view, through attending to what was previously ignored (Whitehead, 1938, p. 143). This is what happened early in the twentieth century with discoveries in relativity and quantum mechanics. The Newtonian abstractions were no longer adequate for known facts and “a wider field of abstractions, a more concrete analysis, which shall stand nearer to the complete concreteness of our intuitive experience,” became necessary (Whitehead, 1967, pp. 66-67). The Newtonian abstractions have indeed been modified and adjusted but not in a way that addresses the fundamental epistemological problems (Northrop, 1991, pp. 205-207). The adjustments, in Whitehead’s view are woefully inadequate. “The stable foundations of physics have broken up,” he writes (Whitehead, 1967, p. 16), and “If science is not to degenerate into a medley of *ad hoc* hypotheses, it must become philosophical and must enter upon a thorough criticism of its own foundations” (Whitehead, 1967, p. 17).

Process and Reality is, of course his detailed proposal for a new metaphysical basis for science (Northrop, 1991, pp. 167, 168). But in a sense, he cut through all the problems with the single doctrine that “Nature is that which we observe in perception through the senses” (Whitehead, 1964, p. 3). Nature *is* sense experience, and the objects of science are abstractions from sense experience rather than postulated entities (atoms, forces, points, and instants) that we can never directly experience. The appearance *is* the reality (cf. Whitehead, 1964, chap. 3-4). With this formula, epistemology collapses into metaphysics, bifurcation disappears and the field of human endeavor, ethics, aesthetics, and so on come potentially into the field of scientific interest. For Whitehead, as we have seen, we do not first perceive discrete

bits of sense data but rather whole events. Those events are, in turn related to other events which thus leave their traces in the immediately perceived event. "The immediate fact for awareness is the whole occurrence of nature" (Whitehead, 1964, p. 14). In the perceived interrelations, Whitehead can maintain, we do directly perceive causation and lawfulness, thus resolving at the same time the problem of induction.

As an example of the kind of transformation in the metaphysical basis of science that this approach opens up, is that time and space need no longer be fundamental concepts. Time and space have been taken to be ontologically prior concepts, Whitehead believes, only because they are simple, while actual experience is infinitely complex (Whitehead, 1929, p. 201). Rather events (or actual entities) are prior. Space is the relations among simultaneous but distinct events, and time is the relation among non-simultaneous events, simultaneity being defined as overlap of durations (Northrop, 1991, pp. 195-198).

The physical sciences have not adopted Whitehead's specific proposals here, perhaps partly due to inconsistencies with verified features of the General Theory of Relativity.²⁰ Nevertheless I believe that further work in the direction indicated by Whitehead will in time yield a firmer foundation for science. As Northrop noted in his critique (Northrop, 1991, p. 207) no one else had, at the time he was writing, even faced up to the problems much less offered cogent solutions.

Notwithstanding problems with his specific proposals, Whitehead maintained that science itself was becoming the study of organisms and, in spite of continuing to use the terminology of Newtonian physics, was coming to presuppose a philosophy of organism (a synonym, in Whitehead's terminology, for process philosophy)

²⁰ Northrop (1991) provides a cogent criticism of Whitehead's position, concluding that bifurcation is required by both science and common sense (192).

(Whitehead, 1967, pp. 152ff). In *Science and the Modern World*, he gives several justifications for that claim (Whitehead, 1967, p. 102). He notes that in scientific theory, matter has come to be understood as a mode of energy, making energy more fundamental; but energy assumes event. But also with field theory, atomic theory, and biology, science has begun to be the study of organisms rather than of particles in space and time. In physics, he maintains (Whitehead, 1967, pp. 153-155), things are considered not in themselves but only in terms of their effects on the movements in space-time (“life histories”) of other things. For physics, a single entity in itself is meaningless. In this “The organic theory represents directly what physics actually does assume respecting its ultimate entities” (Whitehead, 1967, p. 155).

3.4.3 *Process interpretation.*

As with religion, Whitehead has not provided a process interpretation of science itself. I propose the outlines of such an interpretation here.

I take the actual entity of science to be the act of research, culminating in propositions adding to the body of scientific knowledge. Those propositions need not be new laws of nature or theories; indeed the production of such is rare. Rather the propositions produced by the act of research are likely to be validation or falsification of narrow parts or proposed extensions to accepted theory. Often an act of research simply produces a report of new data in its theoretical framework with no more than tentative suggestions as to its possible impact on broader theory. An act of research, in my meaning here, takes place within the larger framework of institutionalized science, which itself may be considered as an actual entity composed of the nexus of acts of research and supporting institutional entities, in series extending from the origins of science. The *given* for any act of research includes the propositions produced by

previous acts of research; the laws, theories, and reported data; the methods, practices, and customs that have evolved in the particular branch of science; as well as the institutional and technological resources that empower research. The given includes not only validated laws, theories, and data; it includes also those that have been proposed and are in the process of validation and falsification. But theories that have been proven invalid are among the given as well: knowing what is not the case narrows the field of what might be the case and may motivate new research.

It is tempting to say that the actual world for science is the sum total of that which is public, empirical, repeatable, and rational. That, however, is only its subject matter. The actual world for science includes also the institutional and knowledge resources of the scientific establishment discussed above, and the entire social and material environment that supports or opposes science, that benefits from it or is harmed by it. That is, large sectors of the human world which, as we have suggested, may be beyond the purview of scientific methodology, at least in its present state.

The prehensions of prior theory, data, and practice are felt by the act of research as the desire to expand the horizons of human knowledge, if only by a small amount. Often, I suspect, it is what is not known, the lacunae or inconsistencies in existing knowledge that form the strongest lure for feeling. But that would only be so in the presence of the faith—or desire—that existence is rational and knowable. The act of research then is the prehensions of what is known, what is not known, methods and practices, and faith in rationality, the confluence of which is felt as the desire to know, and which then harnesses existing practices and knowledge in the actual research. The specific activity typically takes the form of forming hypotheses drawn from theory and attempting to validate or falsify them by appeal to experience. The attempt to validate or falsify may make take the form of experimentation, of passive

observation—or of reviewing empirical data that others have gathered. Concrecence is the movement toward conclusions and the act of research is complete, the actual entity achieves satisfaction, when conclusions are drawn, typically written in formal papers which may or may not be published in scientific journals. In the process, theory may have been modified and new methodological or technical practices may have been developed. At the very least previous knowledge and practice will have been reinforced or weakened. The completed act of research, both in its conclusions and in its mode of practice enter the realm of the given, becoming the “data” that give rise to new acts of research.

Science deals in propositions. A significant part of the given for any act of research, as well as of its concrecence, is the collection of relevant propositions. Those include propositions relevant to the specific subject matter and implicit metaphysical propositions such as those of Newtonian physics, as adjusted for relativity and quantum theory. Scientific propositions are of a restricted class. Whitehead defines propositions as possibilities, whose importance is in their interest more than in their truth. For science, however, the interest in its propositions is in their truth or falsity. If propositions in general consist in the possibility that certain eternal objects could participate in a particular class of actual entities, science is concerned with whether or not those eternal objects in fact do participate in all possible actual entities of that class. Science asks whether the velocity of falling objects is in fact always proportional to the square of the time since release, not whether it is possible that they might. Whereas we suggested that religious dogmas were evocative of an orientation toward a future fulfillment of the consequent nature of God, the scientific theory merely expresses, or reveals a present, and supposedly eternally true state of being. We might say that scientific theory seeks to reveal the

original state of being, as the laws of nature are the logical starting point, or fundamental condition for the functioning of the universe—and for our design of technologies for manipulating the universe.

In its search for true propositions about nature, the act of research first narrows the field to what *can* be searched, that is it creates simplifying abstractions. In doing so it implicitly assumes metaphysical propositions, that are not the subject of its research, and hence not vulnerable to falsification. The act of research proceeds to search for what is true and finds propositions that are true given its restricted field of abstractions and implicit assumptions. Occasionally, however it finds things that call into question its initial abstractions and assumptions. It thus encounters its assumptions as propositions that are not verified and perhaps not verifiable. It encounters its fundamental propositions as possibilities that may, after all, not be possible. That in turn, as a lack of knowledge, gives rise to acts of research on deeper levels, attempting to restructure and if possible verify the presuppositions of science. As we have seen this is what happened early in the Twentieth Century.

But in Whitehead's terminology, the eternal laws that science finds in nature are eternal objects in the primordial nature of God. The act of research, in other words, constitutes a pursuit of features of the primordial nature of God. All actual entities include the ingress of eternal entities and by virtue of that participate in the primordial nature; moreover, by virtue of the fact that the eternal entities are rationally ordered in the mind of God toward his consequent nature, all actual entities experience the lure-for-feeling toward the consequent nature. The act of research, however, actively and self-consciously seeks to uncover and to articulate eternal entities as such.

But the foundational faith in the universal rationality of the cosmos that we have discussed is a proposition that closely resembles religious dogma. As a possibility of the whole, it is by nature not verifiable, and serves as a lure-for-feeling orienting the act of research toward the unending expansion of knowledge. But with what we have said, that would mean that science as a whole is an actual entity drawn to make explicit the primordial nature of God as a whole. Indeed, the proposition/faith in universal rationality would seem already to be an intimation of the primordial nature of God, implicit in each of the eternal objects (see, e.g., Whitehead, 1979, pp. 46, 344).

Science as such examines, but does not change, the world. In that sense it does not participate in the consequent nature of God. Yet science reveals the world to itself, and to the extent that the consequent nature of God involves self-consciousness it does so participate. Certainly, the changes in our self-understanding that have been wrought by scientific advance have had concrete impact on the world. Moreover, scientific knowledge empowers other actual entities in reconstructing the world—religious service organizations, for example, routinely utilize the results of medical science to ease human suffering.

Lured by its intimation of the primordial nature of God to make explicit the rational structure of the whole, it would seem reasonable to suppose, that science will again and again be forced to achieve “a wider field of abstractions, a more concrete analysis, which shall stand nearer to the complete concreteness of our intuitive experience” (Whitehead, 1967, pp. 66-67). Whether or not science widens its field in precisely the way that Whitehead proposes, we may expect such widening to embrace more and more of the structure of reality—or of the mind of God—not by denial, as

deterministic science has sought to deny freedom, but by uncovering and revealing with the aid of presuppositions and methods we do not yet know.

3.5 *Science and religion: A Process-integration Model*

In a frequently quoted statement, Whitehead wrote, “When we consider what religion is for mankind, and what science is, it is no exaggeration to say that the future course of history depends upon the decision of this generation as to the relations between them” (Whitehead, 1967, p. 181). Though several generations have passed since he wrote that in 1925, the decision remains open, and a matter of controversy. The relation between science and religion would appear rather to be a process working itself out than something that we could simply decide. In this section I attempt to model that relationship in terms of Process Philosophy, suggesting that science and religion together may be a single actual entity in the midst of its process of becoming.

Much, probably most, writing on science and religion focuses on the content of theories and dogmas. For example, Barbour’s review of the field repeatedly asks such questions as, “Can evolutionary and religious views of human nature be reconciled?” (Barbour, 1997, p. 263). This approach seems to assume that religion and science are competing repositories of knowledge, whose contents may conflict but which may allow for resolution. Seen in this way, religion would seem to be engaged in a continual process of adjustment and reinterpretation of its beliefs as those beliefs are called into question by science. I am not aware that religious beliefs have ever forced science to relinquish or modify a theory. Whitehead suggests that scientific discoveries have helped religion to refine its beliefs into an “increasing accuracy of expression” (Whitehead, 1967, p. 190), but one may wonder whether such

“refinement” conceals what is really a continual retreat before science. In Popper’s terms, religious beliefs seem to be non-falsifiable: their defenders refuse to put them up for genuine testing, and reinterpretations may be excuses for continuing to hold them when they are invalidated by science.

Whitehead (Whitehead, 1967, pp. 181-192) and others have argued that such reinterpretation is not retreat; that in fact, religion and science contain different kinds of knowledge, for example, meaning and value on the one side, and fact and natural law on the other. The growth of factual knowledge on the part of science has helped religion better to demarcate its realm of knowledge, affirming its knowledge of meaning and value while relinquishing beliefs about matters of fact. For example, the theory of evolution has motivated many, but not all, Christians to separate the meaning of the story of creation from its factual claims: the meaning of the story is true, even though the story itself is not true. Drawing from Whitehead, we said earlier that dogmas are propositions that essentially project a possible world, rather than statements corresponding to what is and must be. In that sense, again, the subject matter of religious beliefs is different from that of scientific theories. That approach, however, may lead to the independence position, which as we have seen fails to account for actual conflict and dialogue and may inappropriately restrict the domains of both science and religion. Whitehead notes that despite fundamental differences in subject matter, religion and science do encounter each other, in the fact that they experience the same data and form theories and dogmas about the same experiences (Whitehead, 1979, p. 16). Moreover religion and science share the devotion to truth (Whitehead, 1926, p. 15). It is that devotion to truth, indeed that makes their disagreements so intense. Rather than mark off independent domains, Whitehead would widen the domains of both science and religion to be more inclusive of each

other; actual conflict he sees as opportunity for deepening understanding (Whitehead, 1967, p. 186). Conflict, then would be a mode of dialogue.

Much is made of similarities in the methods by which theories are developed in science and in which dogmas and doctrines are arrived at in religion. Of note here is the creative process by which both theories and dogmas are proposed to give expression to experience, followed by a period of testing, validation, and adjustment. As noted previously, these similarities may indicate no more than that science and religion are both pursued by human beings. Making too much of these similarities may, indeed, be a case of misplaced concreteness. The creation of theories/dogmas, their proposal, and their testing, are abstracted from the respective contexts, and may well not be so very similar in practice. For example, though dogmas do change under pressure of changing experience, they are not subjected to testing as such. In any case, one cannot help but notice how much more successful science is in generating new knowledge through its “similar” method.

Again, such discussions seem to assume that science and religion are both primarily repositories of knowledge. These discussions may clarify the relations between theory and belief. Such clarification is not unimportant, but it fails to elucidate the relations between science and religion as such. Science is indeed a repository of knowledge and the pursuit of new knowledge. Religion, on the model we have developed here, is not. Rather it is the human response to the vision of God, “worship”, not an examination of the existing world but the building up of a possible world in cooperation with the divine.

We would ask: What is the relation between the act of worship and the act of research? I take as my main clue Warayuth Sriwarakuel’s observation that science and religion have, in fact, supported each other for centuries in a sort of concealed

harmony; religion and science are concerned with the same thing, the nature of reality, though each in a different dimension (Sriwarakuel, 2002, p. 50). Modern science and religion have coexisted in the same societies for hundreds of years, and if their actual relations have alternated among conflict, dialogue, and the uneasy truce of independence, all these relationships are, after all, relationships in a single shared history.

Can we narrow the focus and characterize that relationship more precisely?

I begin by making a few observations. First there is, in fact, very little active conflict between science and religion. Very few religionists oppose science, and not many scientists oppose religion. For example, Christians who oppose the theory of evolution do not attack science, rather, they attack the theory as being *unscientific*, thus implicitly granting to science knowledge of truth about the natural world. Second, religionists routinely utilize the technology made possible by scientific discoveries in carrying out their missions, for example in bringing medical care to the third world, and in spreading religious teachings. Religionists often point to the order in nature that has been discovered by science as evidence of divine creation. Religionists often criticize science and technology for being depersonalizing and for the destructive power that it puts into human hands. That criticism, however, is not typically directed at science and technology as such but at humanity's failure to advance spiritually as much as it has materially. Criticisms of unethical or immoral research, such as in the stem-cell controversy, are again criticisms of particular practices, not of science itself. Such criticisms, indeed, are at least partly self-criticisms of religion for failings in its role of spiritual and moral leadership.

From the other side, while scientists do not modify theory to conform to religious belief, Whitehead and others have argued that religion, particularly

Christianity, prepared the way for modern science and made it possible. Religion has a continuing impact on science by challenging scientific research to be conducted in an ethical manner, eliminating, for example, experiments that threaten the lives and health of human beings. Aside from the fact that many scientists are faithful members of religious communities, many non-religious scientists nevertheless express quasi-religious sentiments and motives for their work. Science, in other words, is at least in part, an extension of Christianity. Christianity, as it were, lives and acts in a universe that is real, rational, and accessible to observation. Science, as it were, observes and describes that universe. As inhabiting the same universe, then, it should be little surprise that, as Barbour indicates, most Jewish and Christian sects accept the Big Bang and evolution as God's way of creating (Barbour, 1990, p. 203), finding no conflict between belief and scientific cosmology (Barbour, 1990, p. 209) and that there is room for human freedom and for God in the universe as described by science (Barbour, 1990, pp. 187-188). Yet, again, the accommodation of belief to theory is not the point. Rather: science stands aside and observes passing events, religion engages, participates in, and initiates events; while science would study religion, religion would harness science to moral methods and religious ends.

It would appear, then, that science and religion may be playing complementary roles in the same human project, modifying and even supporting each other. Both are rooted in wonder and in questioning and both have been instrumental in forming civilization; both are concerned to shed light on the same world. If science forces religion to discover and to stress "its own genuine message" (Whitehead, 1967, p. 189), religion, on the other hand, is among the "the energizing forces of civilization" (Whitehead, 1938, p. 19).

Whitehead notes that both science and religion change over time. Theories change, sometimes fundamentally, in response to new discoveries. Religious dogmas change in response to changes in the culture and in response to the discoveries of science. Again: they change in response to each other as well. Science and religion take very different perspectives on the world, “science as the law of gravitation and religion as the contemplation of beauty of holiness” (Whitehead, 1967, p. 185). Rather than retreating into an independence position, Whitehead would expand those perspectives to yield “a deeper religion and a more subtle science” (Whitehead, 1967, p. 185). That wider perspective may not be immediately available, however. In the face of clashes between religion and science, we may have to “wait” (Whitehead, 1967, p. 185) bearing with conflicts and contradictions as we seek wider perspectives that may indeed only be achieved through conflict, dialog, and cooperation.

That religion and science arose from common roots, that, in spite of frequent conflict, they continue to shape each other and human civilization, suggests a process analysis, attempting to identify them as constituents of a single process, and even as a potential single actual entity currently in the middle—or supplemental—stages of its process of becoming, the concretion of which would be the achievement of a wider inclusive perspective.

3.5.1 Religion and Science as a single actual entity:

The science-religion project.

I propose here a model of the relation between science and religion in which the two are sub-processes within the same overarching actual entity that I call the “science-religion project”. This is an integration model in that the two originate in the same actual world, with the same given and in that they are component and

complementary parts of a unified process towards completion. Said differently, they are parts of the same project within human history (see Sriwarakuel, 2002, p. 50). The present distinction between the two, and their current interactions, then are simply a phase of development as the project moves toward completion—though we do not yet know what that completion will be. In Process terms, the actual entities science and religion participate in a larger actual entity, the science-religion project. That project is constituted in its responsive stage by intersections of prehensions of the given world, especially *via* science and religion; the present relations between the two constituent actual entities, constitutes the supplemental stage in which a subjective aim is formed and the component prehensions undergo intensification and exclusion, and are harmonized towards the satisfaction, or concretion. In this model the concretion is not yet. It is an integration model in which the integration of science and religion is not an established fact, neither is it a theological or philosophical problem. Rather it is a process to be worked through. I refer to it as a “process-integration” model.

It may be objected that actual entities are of very short duration, that the progress from response to satisfaction occupies only a moment. Science and religion together, however, have evidently achieved no satisfaction in hundreds of years. In that case, the objection would go, science and religion cannot constitute an actual entity. The objection misunderstands Whitehead’s concept of time. Actual entities do not exist *in* time; rather time is in them and between them. An actual entity exists for one moment; but a “moment” is just the duration of the actual entity in question. Hence, the “moment” of the science-religion actual entity may well be hundreds of years viewed from within the nexus of actual entities that participate in it. The actual

entity God, indeed, is eternal; that of the act of research months or years, that of the act of worship minutes or hours.

Similarly I do not consider it necessary that the responsive, supplemental, and satisfaction stages should be strictly sequential. Indeed it seems much more likely that there should be overlap between them: that even as prehensions are undergoing intensification and exclusion and the subjective aim is being formed, that new prehensions may continue to impact the actual entity. Whitehead does hold that at the moment of decision, when the precise subjective aim is chosen from among the possibilities, the actual entity is closed and ceases toprehend, to interact. I do not see the necessity for complete and continuing closure here, though there might well be moments of decision in which the actual entity is closed interspersed with periods of relative openness.

To construct our model we must identify the given that is prehended and the functions of science and religion in the supplementary stage in which the efficient cause of the given is transformed into subjective aim in response to the final cause, the lure for feeling, present in the eternal objects that are encountered as part of and through the given.

It is tempting to suppose that science constitutes the physical pole and religion the mental pole of the science-religion project. That would be naive. Science concerns itself with the natural world, which we tend to associate with the physical, and religion concerns itself with the spiritual, which we tend to associate with the mental. Yet science is very much a mental activity in its construction of theories and ways to test them. Indeed the theories and laws of science are very much mental constructs: they explain/describe the physical world, yet they are nowhere found in the physical world. Religion, on the other hand may be spiritual, but its spirituality is acted out and

lived in the physical world. It may be closer to the truth to say that science is the apprehension of the given as efficient cause and that religion is the apprehension of potentiality as final cause and the formation of subjective aim. This fits with the commonly repeated dichotomies associating science with fact, religion with meaning, and the like. Indeed, in examining the static structures of existence, science excludes meaning, value, and purpose from consideration, while religion in responding to meaning, value, and purpose, tends to neglect static structures. All such dichotomies seem over-simplified, however. As we have seen there are givens, efficient cause and final cause, and aims in both science and religion. As components of the same actual entity, moreover, we would expect both to supply prehensions, original “data”, and to participate in the formation of subjective aim.

In our characterizations above, we noted that both science and religion are directly and essentially concerned with the Primordial Nature of God, the eternal objects, though in different ways.

In its formulations of laws and theories, science provides to the science-religion project a map, as it were, of the Primordial Nature of God, as static structure. Like any good mapmaker, science itself is not concerned with any particular destinations, or with human purposes or destiny. Yet, like any good map, science reveals impossible and possible destinations, both constraints on what can be and means of realizing what can be but is not yet. Science then is prehended as the detailed *possible*, stripped of explicit *potential*. Within that set of prehensions is knowledge of efficient causes, but science itself does not function as an efficient cause. Indeed, though science in its work systematically excludes final cause from its view, the world as structured possibility that it reveals may function as final cause. Simply presenting a range of possibilities, however much stripped of value and

meaning, places before the science-religion project a range of potentialities, lures for feeling that demand choice among them, hence, valuation, meaning, purpose. In fact, scientific discoveries often “suggest” applications that were not at all anticipated in the research. The discoverers of the properties of light, for example, did not anticipate the use of optical fibers for rapid data transmission that their discoveries later suggested. Through science, then, the science-religion project prehends the Primordial Nature of God in a limited aspect, which stands in need of filling out.

Said differently: science is the activity of the science-religion project making explicit within itself the static structures of the Primordial Nature of God.

Religion encounters the same world, not as an object of examination, but as meaning, value, and potentiality to which it responds. It provides to the science-religion project ideals, dogmas, and goals prehended as those features of the Primordial Nature of God necessary to fill out the map provided by science. But more than the prehension of potentiality, religion is the activity of evaluating, ordering, assigning meaning. *Vis-à-vis* the discoveries of science it marshals those discoveries toward specific goals and ultimately toward an as-yet-undetermined satisfaction. As a passionate response acting to realize apprehended potentialities, religion on its own may apprehend those potentialities inadequately and inaccurately. Religion, on its own, may thus be in danger of responding in self-defeating ways.

In other words, while religion fills out the meaning and value and purpose that are missing in the deliveries of science, science fills in the concrete details of possibility and instrumentality that are missing from the deliveries of religion.

The analysis so far suggests that science and religion are each intensifying (Whitehead, 1979, pp. 111, 213) opposite sides in a “contrast” within the Primordial Nature of God. A “contrast” in Whitehead’s terminology is two or more aspects of the

same form, the unity of “the many components of a complex datum” (Whitehead, 1979, p. 24, see also, p. 228). A contrast is a “potential for becoming” (Whitehead, 1979, p. 29) and the satisfaction of an actual entity is the “harmonization” of its contrasts (Whitehead, 1979, p. 111). The actual entity may fail to coordinate its contrasts into a coherent relationship, yielding “triviality”; it may ignore the differences, yielding “vagueness”; one side may slip into the background, thus intensifying the other aspect of the contrast (Whitehead, 1979, pp. 111-112). Contrasts elicit “depth” (Whitehead, 1979, p. 114) and it would appear that maximum depth is attained by those actual entities that maintain contrasts in tension with each other, aiming for a higher, or deeper, harmony. “This ‘aim at contrast’ is the expression of the ultimate creative purpose that each unification shall achieve some maximum depth of intensity” (Whitehead, 1979, p. 249).

The contrast that we notice here is the Primordial Nature of God as static structure, and the Primordial Nature of God as potentiality. Science and religion each intensify one side of the contrast, allowing the other to slip into background. The combined actual entity, the science-religion project, sustains and strengthens each aspect, holding them in creative tension, and aiming at an eventual harmony.

What might that harmony look like? Whitehead writes that harmony of contrasts consists in the combination of “narrowness” with “width” (Whitehead, 1979, p. 111), by which he means the depth that comes with focus, and breadth. Religion I suggest achieves depth of meaning through its narrowness of focus on God as origin and destiny. Science achieves breadth by detailed and disinterested attention to what is static, that is eternal, in existence. The achievement of harmony would be a detailed vision of the universe as it is and can be, empowered by and empowering the vision of the profound human and divine significance of being. Put actively: harmony would be

the detailed exploration of the static structures of the universe, empowered by and empowering the passionate pursuit of ultimate meaning; an ever expanding comprehension of the Primordial Nature of God harnessed to the creative realization of the Consequent Nature of God.

On the one hand, religion appropriates science as its handmaiden,²¹ utilizing its discoveries to pursue its goals. On the other, science forces religion to question its understanding of existence, and thus to question those very goals. It is up to neither to dictate the terms of their relationship, to decide the direction of the ultimate harmony. That decision is made—or rather, is in the process of being made—by the actual entity of which science and religion are only components. That entity we can only approximately indicate by such terms as “human history”, “civilization”, or simply: “humanity”.



21 To paraphrase the medieval formula: “Philosophy is the handmaiden of theology.”

Chapter IV

Defense of the Process-integration Model of the Relation between Religion and Science

The purpose of the present chapter is to show how the conflict, independence, and dialog models of the relation between religion and science fail *vis-à-vis* the process-integration model we have developed here. I also argue the greater adequacy of the model developed here over some other integration models. The model developed here not only resolves serious problems in the other models but also includes elements of each of them, providing a model that not only describes the present state of affairs, but which indicates directions for fruitful development into the future. In particular, if science and religion are facets of the same actual entity, then we should look to a future convergence without being able to specify, or dictate, what form that convergence will take.

There is *in fact* conflict between science and religion, in some areas and in some ways they are *in fact* independent of each other, and there is *in fact* dialog between them. It would be naive, however, to take any one of these facts as exemplifying an exhaustive model. One does not define marriage as conflict, for example, although most marriages include conflict. Indeed, the facts of dialog and of independence belie conflict as an exhaustive model, and similarly for the others. Any successful model, in other words, will include the possibilities of conflict, independence, and dialog. I endeavor to show here that the process-integration model does just that.

The conflict, independence, and dialog models seem implicitly to treat religion and science as self contained, independently existing beings that only secondarily come into relation with other, more-or-less as substantial beings whose existence is prior to the accidental relation between them. No one, of course, would maintain that religion and science are constituted by two distinct substances in the Aristotelian sense, but the habit of thinking in terms of substance and essence may unduly have influenced the discourse. This is precisely the metaphysical presupposition that Whitehead rejected: that things are prior to relations. For him, the thing is rather an abstraction from the relations in which it participates; indeed for Whitehead it is the relation that gives the thing its existence. Applying that principle to religion and science, religion apart from science would be an abstraction: in truth, neither religion nor science would exist without the other. We would not say that they come *into* relations of conflict, independence, and dialog, but rather that they come *out* of those relations. If Whitehead is right, then it is insufficient simply to attend to the differences and similarities between religion and science. We should rather attempt to see them both as events within the human response to and pursuit of the mysteries of the spirit and of the world.

Discussions of the relation between science and religion typically begin with the actual and perceived conflicts between them and then proceed to offer resolutions to that conflict. However, rather than begin with an attempt to understand the relation as it stands they tend to move straight from a definition of religion and science to a resolution of conflict. Moreover, rather than taking an empirical look at science and religion as they stand, they propose definitions of “genuine religion” (Einstein, 1993) and of, for example, “postmodern science” (Griffin, 1992a) for which the conflict

would dissolve in a variously conceived harmony. The proposed definitions of “true” religion and science may well be unacceptable on one side or the other.

In order to illustrate this problem and to motivate the discussion I should like to articulate two religious images.

The first image: A Roman Catholic kneels before an image of the Virgin Mary praying in anguish for the safety of her son, a soldier on duty in Southern Thailand, as she says the rosary. Mary the Mother of God, through whom the sacred broke through into the profane (or better: through whom God broke through into the world) and herself the profane who broke through to the sacred (or better: the woman of the earth who broke through to the God), the Mediatrix, is not simply an item of belief, but a fundamental feature of her actual world. She knows, just as surely that “It has never been known that a prayer to the Virgin went unanswered”, that her son may be killed. And yet. Through the Virgin there is a redemption, a reunion. Her son will be, *is* with her and beyond danger in a way that is not only symbolic, not only in memory. In this holy passion, that redemption, that reunion is actual. For her, the paradoxical reconciliation of the statistical probability of her son’s death with Our Lady of Sorrows and hence with resurrection, is the reconciliation of science with religion.

And yet, scientifically, the Virgin Birth, the Resurrection, and the Assumption could not have happened.²²

The second image: A fundamentalist protestant woman kneels beside her bed, with no images or beads mediating between her and her God, pleading with the Lord Jesus Christ—who in her heart she does not distinguish from God the Father—for the safe return of her son who is fighting in Southern Thailand. She prays from within the world that was created by the God of power to whom she addresses her pleas, who

22 Or: a naturalistic explanation would rob them of their redemptive power. It is not their improbability that is significant here (see Dawkins: they *could* have happened, they were just improbable, but natural occurrences) but the intersection of the sacred and the profane.

sustains His creation, her, and her son, in His love. The creation is not for her a symbol or a metaphor; the hand and word of God *actually* fashioned the world and she *is* His creature. She too knows that her son may be killed. And yet. The God of power and love will make the world anew; there will be reunion and redemption. Her son will be, and is, with her in the loving hands of God their maker, not only symbolically or in memory, but actually. For her the paradoxical reconciliation of the statistical probability of her son's death with the God of love and power who created and sustains this very world is already a reconciliation of science and religion.

And yet, scientifically, there was no creation.²³

Some will object that what these women are doing is not genuine religion. But while such supplication is hardly all of religion, it is religion, and since it *is* religion it is *genuine* religion. It is indeed in such practices that the relationship of religion with science becomes problematic and to withhold the "genuine" imprimatur from such practices it to evade, not to resolve or even to understand the situation. In a scientific spirit, we may say that any understanding of the relation between science and religion which fails to affirm the practice of these women as part of genuine religion is thereby falsified. Similarly, any proposed resolution that fails to accommodate these practices is at best a proposed truncation of religion.

I proceed with a critique of each of the models, showing how the process-integration model supercedes and includes them. I then critique some other integration models and finally discuss the process-integration model itself.

23 We can say that the big bang and evolution are the ways in which God created the world, but there seems no reason to say so. We might just as well say that the world is the work of the Grand Noodle, that it is all illusion etc.

4.1 *The Conflict Model*

As we have seen (Chapter II), manifest conflicts between religion and science arise from extreme positions on the one side or the other. On the one hand the insistence that scripture or tradition is literally true *in every sense*, comes into conflict with scientific theories that strictly imply that some aspect of scripture is not true in *some* sense. The paradigmatic case is that of Galileo, whose claim that the earth orbited the sun contradicted Biblical statements implying that the sun moved in the sky. While no one would—or could—take such Biblical statements so literally today, the contradiction between the Biblical story of creation and the scientific theory of evolution does occasion lively conflict today. From the other side, materialists claim that the objects of scientific scrutiny, matter and energy, are all that exists, hence denying the existence of God and the soul, indeed of the spiritual realm altogether. For them, religion is simply nonsense that we would better be rid of.

I look briefly at a representative of each.

4.1.1 *Creationism*

Defenders of the Biblical account of creation attack the theory of evolution. Rather than attacking science as such, they argue that the theory of evolution is unscientific. The attack may be exemplified by Duane Gish's article, "Evolution—A Philosophy Not a Science" (Gish, 1993). Leaving aside much material in the article that is no more than innuendo and ridicule, Gish seeks to put the theory of evolution and the Biblical story of creation on an equal *scientific* footing by arguing that evolution, no less than creation, is neither observable nor falsifiable. "Evolution has not been observed in nature, and even a species cannot be produced [in the laboratory] by the selection of mutants" (Gish, 1993, p. 266). He makes a point of quoting

evolutionists' themselves to that effect, then claims that the theory of evolution is no more than a rigid dogma, held blindly by the majority of scientists, essentially a religious belief with no true scientific status. "It is incredible that most leading scientists *dogmatically* insist [...] that evolution theory [...] be taught as fact [...]"(emphasis added) (Gish, 1993, p. 266); "the inseparable link between [...] non-theistic humanistic religion and belief in evolution is evident" (Gish, 1993, p. 270). The evolutionary scientists that he quotes as denying the observability and falsifiability of evolutionary theory, however, he quotes out of context.²⁴ They were writing, in fact in the context of debates about specific details of the theory, challenging each other's preconceptions in the very process of peer review and falsification that makes of evolution a scientific theory not a dogma. Isaac Asimov in "The 'Threat' of Creationism" (1993) makes a similar point, "The details of evolutionary theory are in dispute precisely because scientists are not devotees of blind faith and dogmatism" (Asimov, 1993, p. 278). I might add that the very certainty of advocates of the Biblical creation story makes them unscientific. In fact there is a great deal of observable evidence and there are falsifiable hypotheses. Theodosius Dobzhansky (1973) in "Nothing in Biology Makes Sense Except in the Light of Evolution" shows how the theory of evolution makes sense of the huge variety of species on the earth and of chemical similarities and differences among them. Biology without the theory of evolution "becomes a pile of sundry facts some of them interesting or curious but making no meaningful picture as a whole." But, as he points out, making sense of a body of facts is what validates a theory; no one has observed the earth revolving around the sun, for example, but the heliocentric theory makes the most sense of measured observations of the locations and movements of

24 Theodosius Dobzhansky, who is quoted by Gish, has written (1973) that "Some of my colleagues and myself have been amused and amazed to read ourselves quoted in a way showing that we are really anti-evolutionists under the skin."

celestial bodies (Dobzhansky, 1973). As Richard Dawkins said on the “Now with Bill Moyers” PBS television program,

It is rather like a detective coming on a murder after the scene.

And you... the detective hasn't actually seen the murder take place, of course. But what you do see is a massive clue...

Circumstantial evidence, but masses of circumstantial evidence.

Huge quantities of circumstantial evidence.²⁵

Attacks like Gish's on the scientific status of evolution may well be considered attacks on science, and, in Asimov's words, a “threat”. The insistence of the “twisted science” of the creationists, especially if they succeed in forcing the schools to teach it, may yield “a generation of ignoramuses”, and cause the United States to “recede into the backwater of civilization” (Asimov, 1993, p. 283).

Gish himself seems to suggest in a backhanded way that the conflict is artificial. Many evolutionists, he notes, both scientists and lay, also are religious people who believe in God and in the *meaning* of the creation story if not in its factual historicity. It is only by insisting on a literalist reading of the Bible that that conflict arises (Gish, 1993, p. 271). Yet, I wonder if he, and Asimov as well, are missing the point. “In the scientific realm, creation is, therefore, as is evolution, a postulate which may serve as a model to explain and correlate the evidence related to origins. Creation is, in this sense, no more religious nor less scientific than evolution” (Gish, 1993, p. 269). Asimov writes (1993, p. 282), “Science is uncertain. Theories are subject to revision; [...] There is something comfortable about a view [religious belief] that allows for no deviation and that spares you the painful necessity of having to think.”

25 *Wikipedia*, Richard Dawkins. Retrieved March 11, 2007.

But the women kneeling and praying for the safety of their sons do not care whether the world and all living things were created 6,000 years ago in six days, or whether the world is a continuing work of 4.5 billion years. She lives *already* in a world of radical deviation and of painful necessity: her son has been ripped from her and sent to the realms of death which may very well consume him as well. For her, there is no correlating of evidence, nor is there any comfort in intellectual certainty. Rather she prays, and lives, in a world that is created by God, at once infinitely distant and intimately present, a world, for one, populated also by Saints through whom the sacred becomes more personal and familiar, for the other suffused by the love of God who comes near and personal through the Father, the Son and the Spirit.

The conflict, if there is one, is not primarily between theory and dogma, but rather, between theory and *practice*: does science deny the existence of the world in which she lives, do the knowledge claims, methods, or presuppositions of science nullify her living practice? They do, as far as they go. Yet Gish's protestations of equal status for the creation story with the theory of evolution, does nothing to restore that world. Rather, the creationist strategy tends to reduce the underpinnings of her world to a theory open like all theories to argumentation far removed from the love, loss, and risk of actual life. But, in fact, there is nothing whatsoever to prevent the conclusion that her world is real, and that science, because of its methodological presuppositions must necessarily *misperceive* the creation as an impersonal material process, and must necessarily reject the possibility of the Virgin Birth, of God and the Saints. That is, simply, the recognition, hardly radical, that science is limited (and perhaps properly so). Some however would disagree.

4.1.2 Scientism

Evolutionary Biologist Richard Dawkins, author, for example, of *The God Delusion*, has famously written that religion is kind of mental “virus” and God a “delusion”, often a dangerous one. His position is evidently that whatever is beyond the purview of science does not exist, “A favourite and thoroughly meaningless phrase is ‘religious dimension’” (Dawkins, 1994). Thus, in his view, science is not seriously limited and there is no religious dimension. The methodological rejection of the supernatural becomes for him a metaphysical assertion. Some of his arguments against the existence of God are telling:

The alternative hypothesis [to evolution], that it was all started by a supernatural creator, is not only superfluous, it is also highly improbable. [...] Any God worthy of the name must have been a being of colossal intelligence, a supermind, an entity of extremely low probability--a very improbable being indeed. (Dawkins, 1994)

But this argument assumes that the religious conception of God is of a causal agent, an entity among entities within the universe. Dawkins has no concept of transcendence. He apparently cannot, or will not, conceive the difference between such statements as “God is that than which none greater can be conceived” and “God is the greatest being”. He is, in Eagleton’s (2006) words “Theologically illiterate”, and the God that he argues out of existence is a being in which no one has ever believed. Similarly, when a Rabbi spoke of humanity as having descended from Adam and Eve and therefore being all of one race, Dawkins wonders,

What are we going to make of an argument like that? The Chief Rabbi is an educated man, he obviously doesn't believe in Adam and Eve, so what exactly did he think he was saying? (Dawkins, 1994)

Dawkins evidently has no concept of mythological modes of expression or of mythological modes of truth. Eagleton again:

Dawkins holds that the existence or non-existence of God is a scientific hypothesis which is open to rational demonstration. [...] [But] God is not a celestial super-object or divine UFO, about whose existence we must remain agnostic until all the evidence is in. [...] His transcendence and invisibility are part of what he is. [...] The Jews of the so-called Old Testament had faith in God, but this does not mean that after debating the matter at a number of international conferences they decided to endorse the scientific hypothesis that there existed a supreme architect of the universe [...]. They had faith in God in the sense that I have faith in you. They may well have been mistaken in their view; but they were not mistaken because their scientific hypothesis was unsound. (Eagleton, 2006)

Dawkins presents, in my opinion, an impoverished view of human existence and his attacks on religion seem no more convincing than the creationists' attacks on science. His, frankly ludicrous, conception of God and of mythology, indicate that he simply refuses even to consider the reality, in any sense, of anything outside the domain of

science. But the domain of science *already* excludes God, the supernatural, and mythology and to argue against the existence of God in scientific terms is tautological. The exclusion of God from science, however, is a *methodological strategy*, “methodological non-theism” (Gilkey, 1993, p. 65). Disallowing supernatural explanations has forced scientists to seek—and often find—natural ones, that strategy is an integral presupposition of science. Yet the first scientists, as many still do today, believed in God. Dawkins, in other words, has transformed a contingent methodology into an absolute metaphysics. He is free to do so as a human being, of course, and he may even be right, but that transformation has no necessity and indeed his arguments have no cogency. To say that science is not limited does not dissolve the limits that science has, after all, imposed upon itself.

The conflict model again falls flat: it is Dawkins, and scientism, that are in conflict with religion, not science itself. As for women praying for their son’s safety, Dawkins would no doubt point out that their prayers have no chance of saving their sons. But the women already know that, as well as they know that the very science that denies the efficacy of prayer makes possible the weapons against which they pray. What they are doing is not engaging some instrumental technology for manipulating events in the world. Rather they are engaging in something utterly different and invisible, because incomprehensible, to Dawkins and the advocates of scientism. Yet there is nothing to say that these women might not themselves be scientists. As Langdon Gilkey (1993, p. 65) writes, “It is because science is limited to a certain level of explanation that scientific and religious theories can exist side by side without excluding one another.”

Neither extreme, in other words, is necessary. Many, perhaps most scientists, are not materialists in the extreme sense. On the other side, scripture can be, and often is, understood metaphorically. Literalists, indeed, are rare.

I would suggest that the mistake is in thinking of science and religion as separate self-contained entities, as though they were distinct substances with incompatible essences. Distinct substances cannot occupy the same space and thus domain overlap entails conflict. Essences do not change and thus the conflict is logically necessary and irresolvable. In the process-integration model developed here, the tension between science and religion derives not from their being separate substances competing for the same territory, but from their being parts of the *same* “substance” already occupying the same territory. The tension derives from a contrast within the domain itself, that between static structure and purpose. Part of the same human project, science and religion each develop or “intensify” one side of the contrast to a higher degree. That alternative intensification leads occasionally to open conflict, but in the long view the conflict is part of a process of re-integration on a higher level. As Whitehead wrote, “The clash is a sign that there are wider truths and finer perspectives within which a reconciliation of a deeper religion and a more subtle science will be found” (Whitehead, 1967, p. 185). Since, in our model, science and religion are not distinct substances, each with its own essence, moreover, they are not each eternally the same. Rather they are capable of fundamental change and even of fundamentally shaping and reshaping *each other* through the tension between them.

The historical fact that religion and science have changed in response to each other and that “wider truths and finer perspectives” have been found may be counted as evidence in favor of a process-integration model and against the conflict model.

4.2 *The Independence Model*

One of the ways in which conflicts between science and religion have led to better understanding has been in more precisely defining for each its proper sphere, and in a consequent deeper self-understanding. Through the battle over the relative motions of the sun and the earth, for example, the Church learned that the physical arrangement of the cosmos is irrelevant to its message and its task. That we could no longer imagine that God literally lived in the sky and that the human world was at the physical center of the universe, forced the Church to a deeper, more spiritual conception of God and of the human soul. It has become clear that science is concerned with observable fact, religion with human meaning, and that these concerns are at least to some extent independent of each other. Taken to extremes, carving out these distinct spheres leads to the independence model: science and religion take different perspectives and pursue distinct agendas in separate, non-overlapping domains; they use language differently. Accordingly they cannot contradict each other even when they seem to be making mutually inconsistent statements about the same thing. Within this model, the theory of evolution, for example, says nothing whatsoever about the meaning and destiny of human life; the story of creation says nothing whatsoever about the physical origins of life. Actual conflicts are the result of misunderstandings.

We begin with the often reprinted essay, “Science and Religion” by Albert Einstein (1993). After confidently defining science as “the attempt at the posterior reconstruction of [perceptible] existence by the process of conceptualization” (Einstein, 1993, p. 148), he acknowledges the difficulty of defining religion, arriving, with some trepidation at the definition of religion as “the age-old endeavor of mankind to become clearly and completely conscious of these [suprapersonal] values

and goals and constantly to strengthen and extend their effect.” (Einstein, 1993, p. 148) Science, he writes is concerned with what *is*, religion with what *should* be. As such, “a conflict between them appears impossible.” But science and religion are complementary, and for this reason Einstein’s position could also be classed as dialogue, science providing the means to attain goals, religion providing the goals and, indeed, the scientist’s “aspiration toward truth and understanding” (Einstein, 1993, p. 149). This essay includes the too-often quoted: “Science without religion is lame, religion without science is blind.”

As convincing as this seems, it is flawed by the fact that Einstein’s resolution depends on a redefinition of religion, or, if you will, a demand that religions become other than they are. Fantastically, he maintains that belief in a personal God is a myth that has outlived its usefulness and should be discarded by religion (Einstein, 1993, p. 149). “The main source of the present-day conflicts between the spheres of religion and of science lies in this concept of a personal God” (Einstein, 1993, p. 140). Very well then, Einstein seems to say, eliminate God and eliminate the problem. He proceeds to argue against the concept of a personal God and reconstructs “religion” as essentially an ethical practice with a sense of wonder towards the universe. The theologian Paul Tillich (1993) answers Einstein, first demolishing Einstein’s arguments against the existence of a personal God (Einstein would appear to have been almost as theologically illiterate as Dawkins). We need not revisit those arguments here. Tillich then points out that in Christian theology, God has always been thought of as personal only in a symbolic or analogical sense (Tillich, 1993, p. 155). However, to remove the personal from God is to render God an *it*. Within our framework, we can see that the religion that Einstein sees as independent of science (or: reconciled through independence) is a religion in which the women pleading for

their sons' safety would have no place. Tillich would seem to agree. For him, God is beyond *both* the personal and the impersonal in a way that includes both. An *impersonal* God,

cannot grasp the center of our personality; it can satisfy our
aesthetic feeling or our intellectual needs, but it cannot convert
our will, it cannot overcome our loneliness, anxiety, and
despair" (Tillich, 1993, p. 155).

Einstein's solution, in short, sees both science and religion essentially as realms of knowledge, failing to recognize the extent to which religion is a *practice*.

The theologian Hans Kung may be taken as an advocate of independence, extending independence, perhaps, to multiple different fields. "The real can be met with in a variety of ways and consequently take on a different character. The reality of the atomic physicist is different from that of the Platonic philosopher" (Kung, 1993, p. 58). Theology, he writes, has "nothing against science's objectivity, neutrality and freedom from values" (Kung, 1993, p. 57). However, the independence, it seems is limited, for he continues, "as long as neither its presuppositions nor its social obligations and consequences are ignored and commitments not excluded." And, as previously cited, theology has "nothing against the ideals of accuracy, precision and efficiency, as upheld by the natural sciences, as long as the latter do not attempt without more ado to extend their methods from watches and computers to man's mind" (Kung, 1993, p. 57). Yet science will accept such limitations not more readily than religion will give up the concept of a personal God. Similarly, for Kung, while theology deals with but one of many aspects of existence, theology's aspect is "the most fundamental aspect [...] [F]rom the one basic aspect *everything* can find

expression, from this aspect the theologian must face *all* questions” (emphasis in original) (Kung, 1993, p. 50). Thus, just as Einstein’s resolution demanded concessions from religion, Kung’s resolution demands concessions from science. This model rather than providing an understanding of the relation between science and religion, demands change in the one or the other as the price of rapprochement.

Conflict, that is, may be avoided if each vacates the other’s domain. But precisely here we return to conflict: science and religion, though each in its own way, each claims all of existence as its domain. Science turns its scrutiny upon anything that can in anyway be observed. Religion asserts its moral authority, its demand for meaning, upon all actions. Still, there is no reason to insist that they will never be reconciled, or even that such reconciliation is not now being worked out. That possibility, however, looks beyond independence to dialogue and possible integration.

We may add Ian Barbour’s complaint that various independence approaches, in particular neo-orthodoxy and existentialism tend to put too great a distance between God, man, and nature, thus making it difficult to conceive of ethics of social justice and environmental ethics (Barbour, 1997, p. 89). Our praying women are, perhaps, neither theologians nor scientists, but the praxis of their prayers confronts the praxis of scientific weapons. Their prayers *confront* a science that denies the efficacy of prayer, substituting for divine efficacy the medical technology that might heal wounds even as it provides the technology that inflicts them.

That confrontation may or may not be conflict or dialogue, but whatever philosophical independence is achieved does not separate science and religion in the conduct of life. Yet there is, I have suggested, already a kind of practical integration in that the women *know* that prayer is not technology even while living in and coping

with a technological world. They already, in other words, live within the maelstrom of nature, God, man, and science.

We noted in Chapter II that given the independence model, dialogue between religion and science, no less than conflict, would be founded on misunderstandings—yet that dialogue often seems meaningful. The model, we suggested, excessively restricts the metaphysical reach of each. Scientific discoveries do, after all, impact human meaning. The first photos of the earth from the moon, for example, or the images of deep space from the Hubble telescope can evoke experiences that may be termed religious. The recently confirmed close similarities between the human and the chimpanzee genomes, *do* affect my idea of who and what I am. Moreover, religion does make statements about matters of fact. Christians, for example, believe that Jesus Christ *in fact* died and was raised from the dead. The model, moreover, conveniently ignores the fact that religion and science have been interrelating and influencing each other in a variety of ways for centuries—millennia if we go back to Aristotle. The independence model, in other words, in spite of being based on important insights, fails as a model of the essential relation between science and religion. As with the conflict model, independence seems to take science and religion as wholly distinct self-contained entities, as though they were Aristotelian substances with different essences—only in this case the essences are sufficiently different that the substances do not compete for the same territory. With this model, science and religion would seem destined to continue their separate ways with no hope of any integration in the future. It is true that each has its own concerns, culture, methods, and so on, yet they are part of the same human history. Inasmuch as they are necessarily and absolutely independent, humanity would seem to be doomed to a sort of civilizational schizophrenia.

The model, it seems to me, fails more deeply, first, in that it denies that both are concerned with the fundamental and ultimate structures of existence. It is true that science and religion are concerned in different ways with what is fundamental and ultimate, yet it is possible that they are concerned with the same thing, that the domain of the one is, in the end, the domain of the other. The model also fails in seeming to deny the possibility that modern science grew out of religion—or at least that Western religion prepared the ground for modern science. To the extent that that is historically the case, science and religion may be seen as branches of the same historical movement—which may one day grow back together.

The process-integration model allows for a provisional independence in that each is developing a distinct aspect of the same thing. Yet it is the same thing, the same domain with which they are concerned: the primordial nature of god. Thus too, they are seen in the process-integration model as branches of the same human project, hence it is fitting that the one may have grown out of the other. In the process-integration model, a degree of independence is important to allow each fully to develop its distinct aspect. Yet, conflict and dialogue are still meaningful, and we may look for pathways to an explicit future integration.

4.3 *The Dialogue Model*

That religion deals in realms invisible to science, and that science deals with *knowledge* of the natural world while religion is a *practice*, further suggests the independence model. The independence model, however, is, in fact, difficult to maintain. Both Einstein and Kung, in recognizing complementarity between science and religion could be classed among advocates of dialogue. Barbour notes several authors that begin with an apparently independence position but end in dialogue. For

the neo-orthodox Thomas Torrance, for example, science raises questions that are by definition beyond the provenance of science, such as why the universe is both contingent and rational (Barbour, 1997, pp. 90-91). The Roman Catholic theologian Ernan McMullin insists that religious and scientific statements are sharply different with no strong logical connection between them; yet he hopes to discover “consonance” between them (Barbour, 1997, pp. 92).

The dialogue model accommodates the sociological fact of dialogue and cooperation between science and religion. While accepting that the two have radically different agendas, as we have seen, (see Chapter II) the dialogue model recognizes important similarities in both method and in domain. The role of creative imagination, the demands of rationality, and approximation and correction for both were noted, as was the fact that both are essentially concerned with fundamental truths about existence. What we found in exploring this model was that science and religion inform one another and that where they differ the most they are often complementary, each supplying what the other lacks, from the one side, for example, facts, from the other, values.

The dialogue model, in short, reiterates much of what we said in our process-integration model. It is a more complete description than the other models of the current state of affairs. Since the dialogue model makes no demands or assumptions what science and religion *should* be there is no reason that this model would exclude the praying women in our image. I suggest that these women’s ambiguous relation to science—it produces both weapons and medicine—on the one hand, and their praxis in a religious world that has no scientific status on the other, constitutes dialogue in their own souls. Neither does the model exclude, for example, Duane Gish and Richard Dawkins; conflict may indeed turn out to have been a form of dialogue.

The dialogue model fails in that it is not a comprehensive model of the relation between science and religion understood historically and into the future. It fails to account, for example, for the extent to which modern science may be said to have emerged from medieval Christianity, or for the extent to which the medieval religious synthesis integrated Greek science within itself. Neither does this model hold out much hope for a future reintegration. As in the conflict model, science and religion are taken as two distinct and self-contained institutions with overlapping concerns, the difference here being that the concerns are negotiable. Again, it is as though they were taken to be separate substances with different essences. As separate substances they cannot occupy the same space, but while there are limited areas to which they may both lay claim, those claims are not absolute.

The dialogue model does not account for the fact that religion and science should even have a relationship, or for the fact that the relationship is felt to be so intensely important. The relation appears as external and contingent. That is, while they encounter each other and interact, that interaction is neither necessary nor does the one essentially involve the other. The similarities and complementarities noted in the dialogue model itself, however suggest the possibility that there is a necessary and internal relationship. That the relation is so deeply felt and that it is historically so persistent also suggests that the relation might be necessary and internal. The dialogue model seems incapable of accounting for that possibility.

4.4 *Integration*

An early and longstanding attempt at integration, natural theology begins with nature and finds indications of the existence of God. These attempts include Aquinas' famous derivation, depending on the impossibility of an infinite regress of "movers":

“Therefore it is necessary to arrive at a first mover, moved by no other; and this everyone understands to be God” (Aquinas, 1948, p. 25). More recent efforts point, for example, to the “Anthropic Principle”, as evidence for the existence of God. That is, that if certain forces had been only slightly different in the early universe, life could not have evolved. While such arguments might make the existence of God plausible, they, of course prove nothing. From our point of view natural theology is inadequate because it does not yield a personal, active God relevant to actual religious practice. As Barbour notes, “this kind of reasoning seems far removed from the actual life of a religious community” (Barbour, 1997, p. 100).

Barbour himself advocates a form of theology of nature.²⁶ This approach begins with religion, both as tradition and as personal experience. Traditional doctrine then is to be modified for coherence with the discoveries of science: “Theological doctrines must be consistent with the scientific evidence” (Barbour, 1997, p. 101). Barbour classes, for example, the scientist-theologians Arthur Peacocke and Teilhard de Chardin as theologians of nature. One may wonder, however, whether the program of adjusting theology for coherence with science might come to threaten the integrity of religion, and, in particular its unique perspective that sees the world *differently* and very possibly in ways that are *necessarily* incoherent with the scientific discoveries. In other words, theology of nature may turn out to be another demand that religion become other than it is rather than a means of understanding its relation with science. Barbour endeavors to maintain focus on actual religious experience and community, religion as a way of life rather than as a theology, yet it seems to me that he veers at times from the actuality of religious practice and experience. For example, he writes,

26 It must be kept in mind that I am critiquing Barbour here and not Teilhard or Peacocke. Barbour cites them, and I repeat Barbour’s interpretations as representing Barbour’s thinking on theology of nature. I intend no implication that Barbour’s interpretations of other authors are correct.

Articulation of the continuing creation theme today must take into account the new view of nature as a dynamic, interdependent, evolutionary process of which humanity is a part. (Barbour, 1997, p. 247)

God it is argued acts in the world, in one or another sense, *through* the laws of that process (Barbour, 1997, p. 247). According to Barbour, Teilhard argues that Christ was not an “intrusion” into the world, but the “continuation and fulfillment of a long cosmic preparation” (Barbour, 1997, p. 248), or the “*fulfillment of evolution*” (emphasis in original) (Barbour, 1997, p. 275). Barbour and Teilhard may very well be right, and yet acts of worship, and in particular the praying women of our image, do not find themselves *only* as parts of dynamic, interdependent, evolutionary processes. They find themselves *also* in the presence of something radically *other* than those processes. They *know* that their prayers are meaningless in terms of those processes, that the Virgin and Jesus as *personally present* to them have no place in those processes. Yet they pray. Yet they worship. And their actions *are* religion. The theologians of nature, then, have presented a perhaps legitimate program for what religion should, even may, become. But in doing so seem to have lost sight of religion as it is.

Teilhard’s position is similar to process theology and Barbour himself incorporates elements of process thinking. Derived largely from Whitehead’s philosophy, important process theologians include Charles Hartshorne, John Cobb, and David Griffin. Their positions are similar enough that for our purposes we need consider that of only one, David Griffin with references to the scientist and philosopher David Bohm to whom Griffin refers. In separate articles, Griffin writes of

a “postmodern” science (Griffin, 1992a) and a “postmodern” religion (Griffin, 1992b) for which they would coexist in harmony.

In “The Reenchantment of Science”, Griffin reviews the very real logical difficulties of the mind-body dualism explicitly assumed by early scientists and tacitly or overtly assumed by many contemporary scientists. He then reviews the logical problems of identism, the elimination of dualism by reducing mental events to physical processes. In spite of the fact that both mind-body dualism and identism are “unintelligible” (Griffin, 1992a, p. 360), one position or the other is required, according to Griffin by the materialist/mechanistic presuppositions of science: if the “physical world” of scientific observation is non-conscious, then either human consciousness (and the consciousness of the observing scientist) is of a radically different substance (that could not conceivably interact with matter) or human consciousness is a material process (that hence could not have the freedom to know or even to be conscious) (Griffin, 1992a, pp. 357-360). The solution, according to Griffin, is to adopt Whitehead’s conception of all things, even to the most inanimate, for example, protons, as having both a mental and physical pole. Said differently, there is purposiveness at every level of existence, including electrons, protons, and quarks (Griffin, 1992a, pp. 361-462). As evidence that such a change in presuppositions is possible for science, he cites the growth of ecological views and of organicism, that is the growing recognition that wholes are not simply determined (influenced) by their parts, but that parts are in turn determined (influenced) by the wholes in which they participate (Griffin, 1992a, pp. 354-357). He further cites quantum indeterminacy as evidence of purposiveness on the subatomic level (Griffin, 1992a, p. 362) (though he had previously acknowledged that indeterminacy is a measurement not an ontological issue (Griffin, 1992a, p. 354)). He particularly cites

physicist David Bohm's conception of the "implicate" and "explicate" order in which every thing/event somehow "enfolds" every other, and the entire universe (Griffin, 1992a, p. 357; see also Bohm, 1992), then suggests that since the universe can be regarded as divine, "Bohm in effect is suggesting that science [...] would include reference to divine activity" (Griffin, 1992a, p. 357). Griffin then proposes a radical expansion of scientific method and domain to include subjectivity and purpose among its objects of study and among its explanatory principles (Griffin, 1992a, pp. 263-264). I do not know whether Bohm would agree that science should "include reference to divine activity", but he does call for a reformation of physics so that it would engender a more healthy world (Bohm, 1992, pp. 383-385), a science that would be "inseparable from a kind of intrinsic morality, and truth and virtue" (Bohm, 1992, p. 385). What Griffin and Bohm seem to be proposing is not only a science in harmony with religion, but a science that has, at least partly, *become* a religion.

In "Creativity and Postmodern Religion" David Griffin (1992b) reviews and defends Whitehead's thinking about God and the theological movement that developed from it, naming in particular, Hartshorne and Cobb. He reiterates the notion of creativity as the ultimate reality, of which all things, both animate and inanimate are instances, with God as the ultimate actuality, embodying creativity and bringing order to the ever-growing and changing multiplicity (Griffin, 1992b, p. 377). He proceeds to show how this conception resolves classical and modern theological problems such as freedom versus determinism, the relationship between God and world, and the mind-body problem (invoking here the mental-physical poles of actual entities) (Griffin, 1992b, p. 378). He discusses problems in understanding the relationship between God and humans, comparing the process theology resolutions to those of Augustine. To what extent does divine power in extending grace, 1) cancel

individual human freedom, and to what extent does it, 2) override social and historical influence on the individual? In short, is it possible to refuse to accept grace? If so, then God's power would appear to be limited; if not, then humanity's freedom would be countermanded. The process solution is that God is present to us in the world as possibilities that go beyond what the world itself offers. Though those possibilities lure us towards God, they do not command. Human freedom creatively responds to (or refuses) those possibilities in its own way and as influenced by its social-historical situation (Griffin, 1992b, pp. 378-382).

Griffin and Bohm's conception of science and Griffin's theological notions are appealing and certainly suggest a profound harmony between the two realms. There are several problems however. First, in spite of its title, Griffin's "Creativity and Postmodern Religion" is about theology not religion. I am tempted to say that it is not even theology, as the God painted here seems to be rather a philosophical conception. I cannot imagine worshipping, or pleading with, such an abstract, intellectual construct.²⁷ But Griffin's vision (supplemented by Bohm's) suffers doubly a shortcoming that infects the other models considered. To the extent that his theology suggests a religion, it would appear to suggest one that does not exist, though he mentions in passing a "renewed interest in spiritual discipline" and a "new worldview" (Griffin, 1992b, p. 378). His vision of reconciliation, then, includes a veiled demand that religion become something other than it is. But his vision of science is also a vision of a science that does not exist, hence demands that science become something other. Yet physics shows no signs of moving in the direction that he proposes. Indeed, as inspiring and coherent as the proposals may be there seems no

27 I mean to imply no criticism of philosophizing about God, only to say that since Griffin's article is not about *religion* it cannot address the relationship between science and religion.

scientific reason for such a reformation.²⁸ It is unnecessary to go into details here. I will only say that precisely what scientific method *is* and what it *should be* are subjects of lively and continuing debate (of which Griffin and Bohm are participants). For example an internet review of the literature suggests that “reductionism” appears more often as an accusation from those who want to reform (or discredit) science than it does in the self-understanding of scientists. But generally, one has to wonder whether the radical expansion of domain and method would rob science of the self-imposed limits that have allowed it to be so successful. For example, even if Whitehead is right that there is a mental pole to all things, or as Griffin puts it that purposiveness operates at all levels, including purposiveness as an explanatory principle would strip science of a methodological principle that forces scientists to search for physical, efficient, causes. As for resolving the mind-body dilemma, surely it is possible for us (and science itself) to acknowledge that it does not have the answer, and for us to seek resolutions elsewhere (perhaps in a Whiteheadian philosophy): science does not have to answer all questions.

The proposals of Griffin and Bohm seem geared to making science all-inclusive, adequate to all areas of knowledge. Though it may one day become so, to call for such an expansion now seems precipitous. Bohm makes an inspirational pitch for his vision of science (Bohm, 1992, pp. 390-391) maintaining that the fragmentary thinking of mechanistic physics leads to a “disorderly, disharmonious, and destructive” world, and that the presuppositions of “unbroken wholeness” (p. 388) in his proposed reformation of physics will lead to an “orderly, harmonious, and creative” world. But does it, and will it? Do economic, political, and social structures,

28 This is not to say that organic as opposed to mechanistic models are not used and even on the rise in science (see Birch, 1998, “Processing Towards Life”), only that Bohm and Griffin’s proposed reformation seems precipitous.

history, not come into play? Wouldn't it make more sense simply to recognize science's limited program and to limit its status appropriately?

In short the integration proposed by Griffin must take its place as but one more proposal among many. But unlike the others, this "postmodern" science, saving the world simply by changing the presuppositions of science so that it would have "reference to divine activity" and be inseparable from "morality, truth and virtue" would seem to engulf religion, replacing it with a kinder, gentler science and an intellectualized spirituality devoid of passion, love, grief, and the abyss of mystery. Like an inverse image of the independence model, Griffin's model seems to demolish the distinction between science and religion. Should such a program gain any real momentum, a whole new conflict between science and religion may be expected to ensue.

Whitehead insisted that in exploring this problem, religion must be clearly known for what it is. Some of his followers would seem to have failed to do so, but rather to treat religion as an independent essence that can be intuited directly by thought alone. Whitehead himself may have been guilty to some extent of such an essentializing of religion, giving an idealized definition of "rational religion" yet he at least attempted an empirical review of the development of religion. If that attempt was flawed, he painted a picture of religion, finally, that easily includes actual worship, supplication, celebration as well as of an intellectualized spirituality (See Chapter III, section 3). My project here is to formulate a workable model of the relations between science and religion, as they actually are, not as I imagine that they should be, moreover, modeling the relation as primary rather than assuming that science and religion are distinct substances that have secondarily come into contact.

4.5 *Process-integration: Different Aspects of the Same Actual Entity*

Any model of the relation between science and religion that aspires to be more than a sociological description of the current state of affairs must account for that state of affairs *and* for its historical development. It must also account for the felt intensity of the relationship and for the historical persistence of that intensity. In other words, the relationship has a history in its own right. The conflict, independence, and dialogue models fail as we have seen, at least partly because they take religion and science as two self-contained entities which have a relationship as an accidental attribute. That is, the relationship is seen as contingent and external. Although no one would assert that science and religion are constituted by Aristotelian substances and essences, some such metaphysics is implied, or tacitly assumed, in making the entities prior to the relationship. This is the metaphysics and style of thinking that Whitehead sought to overcome with his Process Philosophy, “it is fundamental to the metaphysical doctrine of the philosophy of organism, that the notion of an actual entity as the unchanging subject of change is completely abandoned” (Whitehead, 1979, p. 29). Moreover, as Sayer notes:

In the social world, people’s rules and identities are often internally related, so what one person or institution is or can do, depends on their relation to others; thus what it is to be a tutor cannot be explained at the level of individuals but only in terms of their relation to students, and vice versa. The powers which they can draw upon depend partly on their relations to one another, and to relevant parts of the context. (Sayer, 2000, p. 13)

The integration model reviewed, on the other hand would seem to treat religion and science as the same substance, or to press them to become so, thus missing the relation altogether.

In constructing my model, I have followed Whitehead in inverting the priority of entity and relation: *There is* in the world, a relation characterized (among other things) by conflict, by independence, and by dialogue; at different nodes of that relation we find the phenomena referred to as science and religion. As such, there could not be science without religion nor religion without science, and the relationship is both necessary and internal: they constitute each other.

That relation, in turn, cannot exist in isolation, but only as part a complex of relations that goes to make up a broader entity, an actual entity, in process terms. That broader actual entity, I have said, is a single project within human history. I called it, for convenience, the “science-religion project”. That project cannot be fully characterized at present, because it is not complete; it is, in Whitehead’s terms, an actual entity in the supplemental stage. What we can say is that the science-religion project is a response to the primordial nature of God, and that the science-religion relation reflects different aspects of that nature: science is concerned with the primordial nature of God as static structure, religion with it as potentiality.

With this model we can account for the way that Greek science was folded into Christianity in the medieval period and for the way that modern science seemed to emerge from Christianity at the end of that period. Science and religion are both part of the same response, a response that includes and requires both understanding and purpose. In the medieval period the Greek understanding and the Christian purpose were adequate to each other. With the breakup of the medieval synthesis (for a variety of reasons which need not detain us here), the understanding became

inadequate to the situation and the purposes were called into question. The two aspects of the project/response then articulated themselves into relative independence in order to advance towards a new, more enlightened, integration.

The intensity and persistence of the relations reflect the fact that they are parts of the same project. The fact of conflict is explained by there being *alternate* parts of the same project, taking *different* perspectives on the same thing. We noted that in actual conflicts, advocates of religion rarely attack science as such, nor do scientists typically aim to destroy religion. The one does not seek to destroy the other. Rather, religion does not want the successes of science to remove purpose from the common project, while science does not want the passion of religion to override accurate understanding of the world in which its purposes are carried out. A married couple may argue without hoping to destroy each other or the marriage, indeed they may argue precisely because they hope to enhance the marriage, each from a different perspective. Similarly science and religion may sometimes engage in conflict as participants in the common project; “the clash of doctrines is not a disaster but it is an opportunity” (Whitehead, 1967, p. 186). The independence model may now be understood as expressing the fact that science and religion are different *perspectives* on the same thing. Dialogue, in turn, constitutes the continuing coordination of these two factions within the project, for example in ethical oversight of scientific research and in religion-inspired medical missions. With our process-integration model, the fact that many of the similarities between science and religion seem to reflect no more than that they are both human activities is no longer a trivial observation: these are human activities, carried out by participants in the same historical project, often by the same individual human beings.

Because, in my model, science and religion are different perspectives on the *same thing* there is a tendency to collapse the one into the other, thus to deny the difference of perspective. This, I suggest, is what Griffin's integration model attempts. I also suggest that the two perspectives are not yet developed fully enough to allow for, or even to propose, such full integration; the most fruitful path at the moment is rather to maintain the tension between them, rather like the division of labor between family members. The tension, the independence, is only meaningful when they are understood as parts of the same activity: assigning different jobs to different family members is meaningful only because they are one family. On the other hand, the commonality of the activity is meaningful only because the participants are different: a family is, by definition, composed of more than one member.

With my model, we would recognize the limits of science rather than ask it to include everything in its domain: there are things that science simply has, at present, no access to. That is not, of course, to *impose* limits. Science will certainly widen its domain as it develops new methods. At the same time we would recognize the limits of religion, there are things that are not included in religious knowledge. Yet religion retains a certain privilege: inasmuch as it is a practice, and concerns practice, it is not limited to any particular activity, but claims the religious significance of every act whatsoever. As such it may speak authoritatively, morally, (prophecy in the Biblical sense) to scientists, politicians, business managers, and so on. Actual conflict and dialogue will continue, yet these are seen in the model as part of the project.

To combine and paraphrase points that Whitehead makes repeatedly, if there were no separation and consequent conflict and dialogue, there would be no alternation, no progress, no religion and no science. These are characteristics of the relation between religion and science. Or rather: these are characteristics of the inner

articulation of the response to the primordial nature of God whereby religion and science are constituted. Nevertheless full integration models such as Griffin's may represent an intuition into the ultimate singleness of the science-religion project and an intuition into the direction that it may take. In this sense, taken only as a hypothetical prediction, such models may lend plausibility for my model.

It will be objected that my model is purely speculative since the supposed actual entity, the science-religion project, is in process and cannot be fully characterized. There is in fact no full integration of religion and science, hence no satisfaction, no concrescence: we cannot now know whether religion and science will turn out to have been a stage in the process of a single actual entity.

The objection is valid *if* it is assumed that things simply are what they are, in particular that the relation is or has an eternal essence, that it is now what it has been and what it always will be. That assumption betrays the classical preference for being over becoming. One of the failings of such assumptions, and a weakness of the conflict, independence, and dialogue models, is that there is no indication of a pathway to, or even possibility, of a future rapprochement or integration. In the process view, on the contrary, a thing's *being* is its becoming *something else*, about which there is an element of unpredictability. But the very act of describing and/or of predicting may well become part of the process, influencing what is to become. The relation itself between science and religion is in process of becoming what it *will* be and any fixed characterization of that relation tends to freeze it as *this*, never to be anything *else*. I confess that I do not know whether or not science and religion will prove to have been elements in the same actual entity. My model is rather a process-integration model that knows itself to be part of the process, admittedly speculative as regards the future, but grounded in the facts of the present and of history. Rather than

a weakness, its speculative nature as regards the future is a strength, allowing us to think in terms of, to imagine, and to act towards, possibilities, without yet insisting on any specific final form of the relation in the future. That is, the model expresses the concrete present with its accomplished history, together with openness for the future. The model is, in Whitehead's sense, a proposition, a possibility with implications for how a fruitful integration can be worked out. Some of those implications will be sketched in the concluding chapter.

I must finally ask whether my model is consistent with the religious practice of the women praying for their son's safety. As with the dialogue model, my model makes no demands of religion or science and thus excludes no practice. It may be objected that Whitehead's idea of God is a philosopher's God, an intellectual construct incapable of inspiring worship and devotion. But Whitehead's God need not be directly and entirely equated with the God the Father of Christian tradition, though we may suppose that the one is a manifestation of the other.²⁹ There seems no reason, in Whitehead's scheme that God the Father, God the Son, God the Holy Spirit, Allah, Mary and the Saints, and so fourth, could not refer actual entities with which, though invisible to science, human beings somehow interact. Indeed, for all the intellectual sophistication of Whitehead's *system*, the system affirms the passion of *actual* existence, of response to the "vision" that demands only "worship" (see Chapter III, section 3.3). I suggested above that there was science-religion dialogue in the women's own souls. I now extend that suggestion to say that the women are suffering the science-religion project as workers within that project, endeavoring, through prayer, to bring science, as means for both good and ill, into the service of peace and life.

29 Without committing here to which is which. The relation of the God of philosophy to the God of religion is an ancient issue, but beyond the present scope.

Chapter V

Conclusions

In the present thesis I have made and defended the claim that science and religion are integral parts of the same human project and that the manifest differences between them indicate no more than that they perform different functions within that project. On one level, the fact that they have flourished side by side in the same societies for hundreds of years indicates, at the very least, that they are both part and parcel of the same human history. Yet, though both science and religion can be, and are, studied as social and historical phenomena, with the possible exception of Max Weber and his followers, I am not aware of any serious studies treating the two as integral parts of the same social and historical process. Along with the sociology of religion and the sociology of science, could there not be a sociology of religion-and-science?³⁰

Such a sociology would be of great value, yet it seems to me that social and historical studies would not do full justice to the relationship—just as, in my opinion, the sociology of science and the sociology of religion do not do full justice to science and religion. Each claims to be, and perhaps is, something more than a “mere” social institution, a set of socially conditioned behaviors. Accordingly, I have taken the

30 Max Weber's work is significant, yet his seminal ideas do not seem to have been carried forward. That perhaps explains the rarity of references to Weber in the literature on the relation between religion and science.

obvious (if unremarked) fact that they are parts of the same society only as a clue to a deeper, more profound relationship.

Sociology of religion and sociology of science is inadequate because science and religion both make claims to independence from social forces. Religion claims a transcendent dimension inasmuch as it is a response to God. God is Alpha and Omega, Creator and Final Destiny, the ultimate, which, as it were, brackets the relative. As response to God, religion participates in that ultimacy, thus transcending society. Science, in turn, claims that the truths that it discovers are universal, independent of social forces: the laws of nature are the same anywhere and everywhere. Science, in other words, is concerned with discovering the ultimate structures of existence. It is the fact that both science and religion are concerned with ultimate reality that leads them to encounter each other and that lends such intensity to the encounters: there is but one reality and there can be no compromise where ultimates are concerned. Because their approach to ultimate reality is very different, the encounter is often conflictual. Science ignores such concerns as value, morality, and destiny, and religionists fear that science may morally impoverish the world and lead humanity away from God. Religion, on the other hand, in its response to transcendence often neglects mundane matters of fact, and advocates of science may fear that religion may lead humanity into ignorance and superstition.

At the same time, the fact that their approach is very different lends a kind of independence of science from religion, and that relative independence makes dialogue between them possible.

But what we have just said treats science and religion as wholly distinct, well-defined, and self-contained entities that only secondarily *have* a relation, as though they were distinct Aristotelian substances with essences. Manifestly, they are not. The

definitions of science and of religion remain contentious, the word “religion” does not refer to a single unified institution, but to a loose collection, rather a hodge-podge, of institutions, often in conflict with each other and whose boundaries are unclear, each deeply implicated in other social institutions. To a lesser degree, the same may be said of science: there are many branches and within each branch many sub-branches.

There are many research institutes, competing with each other for funding. Even within a sub-branch and within institutes there are disputes over theory, but conflict over theory is part of the process of falsification/verification that is part of the method itself. Treating science and religion as well-defined distinct entities would then seem to be a case of misplaced concreteness, taking the words to represent beings in an uncomplicated way.

What I have done, rather, is to ask whether science and religion might be understood as elements in the same human project. Whitehead focuses on events rather than on beings, and thereby understands beings as elements of events, rather than understanding events as simply the movements of beings. That is, he inverts the relationship between entity and relation: for him the relation constitutes the entity. In the same way, I have attempted to focus on the relation between science and religion, and on the overall event in which that relation participates. In other words I have tried to understand the relation as an “entity” that “has” science and religion as nodes, the relation itself being part and parcel of a complex of relations in a wider project—a wider project that could be understood as an “actual entity” in the language of Whitehead’s Process Philosophy.

Again, a purely social analysis would not do justice to science and religion’s ultimate concerns. I began, therefore with a process analysis of science and of religion, which attempted to make their ultimate concerns explicit. I found that while

their approach was very different, they were both genuinely and honestly concerned with what Whitehead calls the primordial nature of God. Religion *responds* to that nature aiming for the world which it implies as possibility. Science *examines* that nature and in describing its structure reveals possibilities and impossibilities and instrumental means of achieving the possibilities. Seen in this way, science and religion appear as elements in the same human project of bringing the primordial nature of God to fruition—that is of creating, in partnership with God, the consequent nature of God. In the context of that project, necessary concern with the primordial nature of God leads to elaboration of its differing aspects, structure on the one hand and possibility on the other. That differential elaboration manifests at this point in history as the differentiation of science from religion. Again, in Whitehead’s terms, the science-religion relation is a “contrast” within one actual entity. The actual social relations of conflict, independence, and dialog (among others) are ways in which the contrast is working towards a higher level of integration. I have, in other words, proposed an integration model in which science and religion are already integrated in their common concern with the primordial nature of God and by virtue of being elements of the same human project, but in which their separation is a stage on the way to a higher level of integration, in a concrescence and “satisfaction” whose precise form we do not yet know.

5.1 *Implications*

To be meaningful, any model of the science-religion relation should have implications for that relation and for science and religion. For example: how can their interactions be made to be more fruitful and beneficial for humanity and the world?

How does the model help us better to understand religion and science themselves?

David Bohm writes:

Because we are enfolded inseparably in the world, with no ultimate division between matter and consciousness, meaning and value are as much integral aspects of the world as they are of us [...] Science must therefore overcome the separation between truth and virtue, value and fact, ethics and practical necessity. To call for this nonseparation is, of course, to ask for a tremendous revolution in our whole attitude to knowledge.

(Bohm, 1988, pp. 67-68)

How is such a “revolution” to take place? I suggest that the model offered here can give guidance.

The contrast of structure-potentiality in the primordial nature of God is real; consequently the separation between science and religion within the one actual entity is real and important. Science’s neglect of such things as value and meaning allows it to focus fully on structure. Religion’s relative neglect of strict matters of fact allows it to focus more fully on such things as meaning and value. In that sense, we would not want to collapse science and religion into each other, but, at least for the foreseeable future, to keep them distinct. Nor would we want to eliminate conflicts. As Whitehead writes in a previously cited passage, “The clash is a sign that there are wider truths and finer perspectives within which a reconciliation of a deeper religion and a more subtle science will be found” (Whitehead, 1967, p. 185). But it is not only that opposition can be productive, but also that science and religion are indeed developing, to a high degree, different aspects of the same ultimate reality. Therefore, as enticing

and, ultimately, valid Bohm's vision might be, it would be precipitous and unwise to for science immediately to attempt "to overcome the separation between truth and virtue, fact and value, ethics and practical necessity." The continued relative independence of science and religion is a necessary element of their differential development, and conflict and dialogue are part of the way that each keeps the other within their common project. Rather than expand the domain of science, my model suggests, we should frankly recognize the limits of science, understanding especially that its methodological presuppositions do not necessarily imply metaphysical truths. Even to the extent that science replaces reductionistic mechanism with organicism, it must be said, we would still take those presuppositions as methodological not metaphysical. We would not, then, attempt to force a premature harmony between religion and science. Rather than eliminating existing relationships, my model suggests adding a new dimension to them. Recognizing that they begin with the same ultimate reality, the primordial nature of God, and that they are parts of the same historical project, we may legitimately begin to ask what that project is: what are the common goals toward which both science and religion aim? And then: how may we frame independence, conflict, and dialogue in ways that advance the overriding project? These are not questions for scientists and religionists alone, but more for the institutions that include and support them, for example, universities and foundations. I do not here attempt to answer these questions, beyond the general suggestion that it would involve peace with justice, harmony, and prosperity, within the human community, but also with other creatures and the natural environment as a whole. It would involve the continual increase in creativity and delight, perhaps what Aristotle meant by *eudaimonia*, "flourishing". In any case these questions cannot be answered once-for-all in advance. It is the very nature of the concretion of an actual entity that

such questions are answered through the process itself—they are worked out and decided, rather than discovered or deduced. Nevertheless, it seems likely that the mere recognition of common cause, and attempts to articulate that cause, would enhance existing cooperation between science and religion for the common good, and would channel controversy in more productive directions. I previously invoked the metaphor of a family to suggest how parts of the same entity could conflict with each other without seeking to destroy the entity and indeed while seeking to enhance the entity. Another metaphor might be that of a well-functioning government in which distinct branches are set in competition with each other in a “balance of powers”. Each prevents the others from becoming too powerful while also challenging the others to work for the welfare of the people. Thus checked in their power and constantly reminded of their common purpose, the different branches function as the single government that they in fact are. That is, through difference of function, conflict, and dialogue the various branches function as a unity. I suggest that the balance of powers in a single government is analogous to the science-religion relation, and that that relation can be enhanced and made more productive through attempts to articulate the common purpose.

A particular danger must be kept in mind. The articulation of the science-religion project and too hasty attempts to build institutions integrating science with religion, could result not in integration but in a third institutional force that is neither, and that is accepted by neither. Such an institutional force could well lead not to greater rapprochement, but to greater conflict, itself becoming just another combatant. This, for example, is what happened with Sikhism. Founded as an integration of Islam and Hinduism through which harmony between the faiths would be achieved, Sikhism was rejected, indeed despised, by both, and within a few generations had become a

militant and militarized movement continually at war with both Hinduism and Islam and exasperating rather than mitigating the conflict. With that in mind, attempts to advance the concrete integration of science and religion must do full justice to both parties and must fully include scientists and religionists every step of the way.

5.2 Suggestions for Further Research

I have maintained that the science-religion project is an actual entity in the supplementary stage, so that we cannot yet know what its satisfaction will be. It is possible, even likely, that that actual entity is actually a continuation of an “enduring entity”, a series of similar actual entities, that has had previous satisfactions, giving rise to new processes of separation and reintegration/satisfaction. The medieval synthesis may be one such satisfaction, the breaking up of that synthesis being the generation of the next actual entity. Greek science/philosophy, on the other hand, would appear to have broken away from prior Greek religion, inasmuch as it calls that religion into question. In other words, there are hints of a cyclical separation and reintegration on higher levels over a broad stretch of history. Such a cycle, if it exists, might be interpreted as a series of concretions of actual entities constituting an enduring entity. Historical research into this possibility may well help to clarify the present science-religion relation and suggest a direction or trajectory from the past into the future. That is, such research may help to articulate the science-religion project that I have hypothesized.

Even restricting my interest to Christianity and modern Western science, I have painted both science and religion with a broad brush. They are in fact extremely varied. Christianity is constituted by hundreds of sects, often in conflict with each other. Some sects indeed are not accepted by some other sects as “truly” Christian.

There are similarly many branches of science with significantly different methodologies. Some of these branches, for example parapsychology and some sub-disciplines within psychology, are not considered scientific by some scientists. Science and religion, then, must each be considered as composed of many actual entities, and a properly thorough understanding of the science-religion relation would require analyses of each of the subordinate actual entities and their individual relations with each other and across the science-religion divide. The Evangelical relation to the theory of evolution, for example is very different from the Roman Catholic relation to the theory of evolution, and the Evangelical relation to physics is very different from the Evangelical relation to biology. In other words rather than imagining a simple concrescence/integration of religion and science, we have to imagine a concrescence/integration of Evangelical with liberal with Catholic with Orthodox with biology with physics with psychology etc. I suspect that the approach taken here, of tracing manifest differences to contrasts in the shared ground of concern, would be fruitful in understanding this complex network of differences and conflicts, and of mapping out avenues of integration.

In short, much more detailed research and analysis are called for, including the discovery and description of social-historical connections. I said in the previous section that sociology alone would not do justice to science, religion, or their relation. Such studies would not be sufficient—but they would be a necessary part of any adequate analysis.

I have used Christianity here as the prototype of religion. This was a convenient narrowing of focus. Whitehead's own orientation was Christian, modern science developed in a Christian context, and continues to be associated with the Christian West. Moreover, much, or most, of the writing on the science-religion

relation has been done from a Christian point of view. Similarly, my prototype of science has been mainly physics. Again this was a convenient simplification as physics is typically taken as the most basic or representative science. Both simplifications were necessary for the sake of a manageable scope. However, such simplifications severely limit the applicability of the thesis. While the other monotheistic religions—Islam and Judaism—might be made to fit into the model without radical adjustment of the model, non-theistic and polytheistic religions such as Buddhism, Taoism, and Hinduism, not to mention the many “primitive” animisms, may present greater difficulties.³¹ Further research, therefore, would involve process analysis and modeling of other religions and of their relations or possible relations to the different branches of science. Buddhism, for example, does not seem to be constituted by acts of worship in the same way that Christianity is. Moreover, Buddhism is routinely said to have a more nearly scientific attitude than other religions, yet we may well expect that with closer contact such doctrines as karma and rebirth will be felt to conflict with scientific theory. In any case, Buddhism and its relation with science are likely to be very different from what has been presented in the present thesis.

The same reservations apply to the choice of physics as the prototype of science. The different branches of science (or: the different sciences) have very different fields of interest and correspondingly very different methods. Further research is needed looking at each of the branches of science, including those whose “scientific” status is uncertain.

31 We may note here that Whitehead’s scheme of a “progression” of religion from ritual to emotion to belief to rational, like the 19th century schemes of progress from savagery to barbarism to civilization do not withstand the scrutiny of contemporary historical and anthropological research.

5.3 *Personal Reflections*

Finally, I would like to suggest that a process view might be appropriate to a wide variety of social fields beyond religion and science. In particular, in my work as a financial analyst I have dealt with a wide variety of budgets, planning strategies, management, evaluating trends in property values, stock prices, production costs. I have had to balance the demands of wealthy shareholders against profitability, employment unions and staff. What has become clear, with the help of process philosophy, is the fundamental interdependence of all these issues. Each issue in my work quickly reveals itself as not the problem of an isolated individual but rather as patterns involving ever-widening circles, societies, wholes. No one problem can be solved in the financial sector alone but requires groups of people and the growth of expertise and synergy. What seem to be individual problems are related to other problems, often extending to national and international levels and involving international agreements. Solutions to the problems of the individual, then may involve cooperation throughout the world community. The whole, global capitalism, profoundly impacts the parts, altering nations, businesses of all sizes and individual persons. Often indeed globalization has made certain kinds of business possible. At the same time it is the nations, businesses, and individual persons that together constitute, or make up, global capitalism. In other words, the political and economic state of the world today very much resembles the part-whole relation posited by Whitehead: the parts and the whole are mutually determining. I suggest that process analysis of the sort pursued here will yield important insights into the emerging global order, and that such analysis may reveal pathways to humanizing that order.

Working in the corporate world, the world of global capitalism, which many consider the very bastion of radical individualism and greed, the radical

interrelatedness of all beings is evident to anyone who pays attention. We see the connections among corporate greed and the crises of poverty, growing inequality, environmental ravages and social disintegration. David C. Korten writes in *The Post-Corporate World: Life After Capitalism*:

We have approached the market as though it were a license to amass unlimited individual wealth without individual responsibility, when in truth it is about meeting basic needs through the mindful participation of everyone in the equitable and efficient allocation of society's resources. We have treated the good life as a process of material acquisition and consumption without limit, when in truth it is about living fully and well in service to life's continued unfolding. (Korten, 1999, p. 275)

I believe that Process Philosophy applied to social, economic, and political fields can help us to construct global institutions in which resources are allocated equitably, in which "living fully and well in service to life's continued unfolding" is the most natural and obvious way to live.

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Appendix

Christian Creeds

The Nicene Creed is professed by virtually all Christian sects both Eastern Orthodox and Western Catholic/Protestant. The Apostles Creed is not used in the East, but is professed by virtually all Western sects.

Nicene Creed

We believe in one God,
the Father, the Almighty,
maker of heaven and earth,
of all that is, seen and unseen.

We believe in one Lord, Jesus Christ,
the only son of God,
eternally begotten of the Father,
God from God, Light from Light,
true God from true God,
begotten, not made,
of one being with the Father.

Through him all things were made.

For us and for our salvation

he came down from heaven:

by the power of the Holy Spirit

he became incarnate from the Virgin Mary,

and was made man.

For our sake he was crucified under Pontius Pilate;

he suffered death and was buried.

On the third day he rose again

in accordance with the Scriptures;

he ascended into heaven

and is seated at the right hand of the Father.

He will come again in glory

to judge the living and the dead,

and his kingdom will have no end.

We believe in the Holy Spirit, the Lord, the giver of life,

who proceeds from the Father [and the Son].

With the Father and the Son

he is worshipped and glorified.

He has spoken through the Prophets.

We believe in one holy catholic and apostolic Church.

We acknowledge one baptism for the forgiveness of sins.

We look for the resurrection of the dead,
and the life of the world to come. AMEN.

(Source: www.spurgeon.org/~phil/creeds/nicene.htm)

Apostles' Creed

I believe in God, the Father almighty,
creator of heaven and earth.

I believe in Jesus Christ, God's only Son, our Lord,
who was conceived by the Holy Spirit,
born of the Virgin Mary,
suffered under Pontius Pilate,
was crucified, died, and was buried;
he descended to the dead.
On the third day he rose again;
he ascended into heaven,
he is seated at the right hand of the Father,
and he will come again to judge the living and the dead.

I believe in the Holy Spirit,
the holy catholic church,
the communion of saints,

the forgiveness of sins,
the resurrection of the body,
and the life everlasting. AMEN

(Source: <http://www.creeds.net/ancient/apostles.htm>)



Biography

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