WHY DO THEOLOGIANS NEED TO BE SCIENTISTS?

by Stanley J. Grenz

Abstract. The postmodern situation has given rise to a quest for new understandings of the relationship between theology and science. Drawing illustrative material from an episode of *Star Trek: Voyager*, I look at three paradigmatic answers to the question posed in the title—the modern empirical scientific, the renewed medieval, and the postmodern—with the goal of outlining a methodological approach for an engagement between Christian theology and science in the postmodern context. Drawing insight from post-empirical philosophy of science and the sociology of knowledge, I argue that both science and theology engage in the task of constructing a world for human habitation.

Keywords: eschatology; methodology; philosophy of science; sociology of knowledge; theology.

While part of an "away team" exploring the subterranean religious sanctuary of another civilization, the overly exuberant Kess dashed into a sacred shrine and as a result became deathly ill. In a bid to save her crew member, Kathryn Janeway, captain of the star ship *Voyager*, following the advice of one of the spiritual leaders of the alien people, engaged in a grueling physical and mental purification ordeal. Despite her successful completion of the test, however, Janeway learned that the only possible way to save Kess would be to put aside her dependence on her personal abilities and commit her dying friend to the ancestral spirits who inhabited the shrine Kess had violated. Faith finally prevailed over scientific rationality, as Janeway carried the unconscious Kess across the shrine's threshold. The miraculous healing accomplished, Kess safely on board *Voyager*, and the routine medical

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examination completed, the ship's doctor offered the captain his theory as to how reentering the shrine's court had reversed the young woman's terminal condition, an explanation that mentioned biogenic fields and biological reactions but omitted any reference to the possible role of the spirits in sparing her life. Asked to respond to the doctor's reconstruction of the events, Janeway, whose deep reflection had been interrupted by the query, remarked just before she left the room, "It's a perfectly sound explanation, doctor, very . . . *scientific*."

According to Ian Barbour, there are four ways of relating science and religion: conflict, independence, dialogue, and integration (Barbour 1990, 3–30). In the recent past, relations between the Christian faith and modern science have more often than not been characterized by either conflict (see Russell [1935] 1961) or an assumption of the independence of each from the other. Today, however, there is a growing chorus of voices—of both scientists and theologians—calling for new styles of engagement characterized by the kind of dialogue that can lead to mutual interaction or a new integration of the two, whether through a renewed theology of nature, as Barbour himself proposes (Barbour 1990, 30), or a new critical realism, such as that articulated by Arthur Peacocke (1993, 21), to cite two widely acknowledged examples in a growing list of proposals (Gregersen and van Huyssteen 1998).

This impulse has led many thinkers to look to the territory where theology and science supposedly overlap for the focal point of a potential rapprochement. Initially cosmology emerged in the minds of many as an area of promising dialogue and mutually beneficial integration (McMullin 1981a, 17–57), an approach that continues to gain adherents (see van Huyssteen 1998, 30). More recently, however, attention has shifted to the larger question of method (McGrath 1998, 34), as certain thinkers have sought to determine whether or not there is a fundamental methodological overlap between practitioners in the two fields (for example, Murphy 1990).

The attempt to discover a connection in method between the disciplines is not new. Christian theologians throughout the history of the church have engaged in the task of relating their discipline to science and the scientific endeavor. Moreover, many theologians have not only understood their enterprise as standing in a positive relationship to science but have seen themselves as practitioners of science in some sense of the word. This leads, however, to the question: In *what* sense? Exactly *how* are theologians scientists?

The purpose of this article is to address this query. More specifically, I intend to respond to the question, "Why do theologians need to be scientists?" from a self-consciously Christian theological perspective by interacting with three models present among Christian thinkers of various disciplines, but especially among theologians. The goal of this critical engagement is to outline a methodological approach for Christian theo-

logical and scientific engagement in the contemporary, postmodern context in which God has placed us.

The Modern Paradigm: Theology Is Like a Science

Why do theologians need to be scientists? The paradigm that reigned from the seventeenth century to the 1970s looks to science to provide the methodological model for theological reflection. Lying behind this program is the assumption that theology is like a science, and hence that theologians are actually aspiring scientists.

Enlightenment Science. Francis Bacon (1561–1626) and Galileo (1564–1642) stand at the beginning of a long shift in thinking away from the Aristotelian approach of the Middle Ages to the empirical science that characterizes modernity. Bacon inaugurated the focus on experimentation. He was convinced that the experimental process would not only lead to individual discoveries but would also show the interrelations of the sciences themselves, thereby bringing them into a unified whole. To this end, Bacon placed at the foundation of the sciences a body of truths he called "first philosophy," consisting of the axioms shared by the various sciences together with the laws of reasoning (Reese 1983, 48). Bacon looked to this fledgling enterprise not only as a way of discovering nature's secrets but also as providing the means to exercise power over nature and thereby alter nature for human benefit.

Galileo's innovation consisted in his focusing on a strictly quantitative perspective from which to understand the universe. Hence, he pioneered the mathematical approach to experimentation, a program that yields quantifiable results (i.e., numbers rather than non-numerical qualities). The great advantage of this focus on numerical measurements is its ability to give the sense of yielding exact and unambiguous knowledge of the world.

Lying between these thinkers and the full flowering of the new empirical science was a methodological revolution inaugurated by René Descartes (1596–1650), who is often characterized as the father of modern philosophy.[1] Concerned about the problem of error and consumed with the quest for epistemological certainty, Descartes sought to devise a method of investigation that could facilitate the discovery of those truths that were absolutely certain—in accordance with the pattern of mathematical certainty. To pursue this goal, Descartes introduced *doubt* as the first principle of reasoning. When the mind doubts everything, he noted, something certain emerges. The doubter cannot question the existence of the doubting subject. Thus, Descartes concluded that the existence of the thinking self is the first truth which doubt cannot deny, as capsulized in the well-known adage of Cartesian philosophy: *cogito, ergo sum*—I think; therefore, I am (Descartes 1969, 127–28).

In this manner, Descartes claimed to have established the foundations of knowledge by appeal to the mind's own experience of certainty. On this basis, he began to construct anew the human knowledge edifice, convinced that this epistemological program yields knowledge that is certain, culture- and tradition-free, and universal. Foundationalism, understood as the quest for complete epistemological certitude by the construction of the house of knowledge on an unassailable foundation, was born.

Descartes's foundationalism, together with the work of innovators such as Bacon and Galileo, opened the way for the scientific revolution that marked the break with the Middle Ages. Thinkers in the Age of Reason rejected as metaphysical speculation the medieval preoccupation with "natural tendencies," *telos*, and "inner purpose," and hence the driving assumption of medieval science that every object followed a "natural" tendency to fulfill its own inner purpose. Instead, the Enlightenment theorists drew from the mathematical, quantifying view pioneered by Galileo more than a century earlier. They believed that precise methods of measurement and the acceptance of mathematics as the purest mode of reason formed the tools for the proper approach to the study of natural processes. Scientific observers, in turn, were to describe phenomena in accordance with laws of nature which, the Enlightenment foundationalists believed, yielded quantifiable results and hence knowledge that carried indubitable certitude.

Although T. F. Torrance argues that the basis for the new empirical science lay in the theological gains of the Reformation (Torrance 1969, 59–76), more directly instrumental in the development of the emerging scientific method was the work of the British philosopher John Locke (1632–1704). Locke's goal was to develop a universal method of inquiry that would be applicable to all intellectual disciplines—theology as well as science. He rejected Descartes's view that our basic beliefs consist in innate ideas from which we deduce other beliefs. Rather, Locke argued that the foundation for human knowledge (that is, demonstrative knowledge characterized by universality and certainty, which can be stated in the form of assertions) lies in sense experience (that is, observations of the world), from which we abstract ideas and induce conclusions. His proposal, known as empiricism, provided the methodological program for the foundationalist turn in science.

The picture of this empirical world was supplied through the work of Isaac Newton (1642–1727). Newton conceived of the universe as a grand, orderly machine whose movements could be known because they followed certain observable laws. In this manner, Newton provided the impetus for replacing the organic view of the world, which dominated the ancient understanding, with a mechanistic model, which reduces reality to a set of basic elements or elementary particles (plus continuous fields such as electromagnetism and gravity). Each particle embodies an essence that determines its nature and value; each is what it is apart from the other particles.

These autonomous particles interact with each other—they push each other around, as it were—but such interactions do not affect their inner natures (Bohm 1988, 60–62).

The work of these thinkers resulted in what Arthur Peacocke terms the "standard account" or "received view" of the structure of scientific theories.[2] The received view was connected to a particular understanding of science and the world. Mary Hesse summarizes the twentieth-century form of this position (which she rejects) in the following manner:

> . . . there is an external world which can in principle be exhaustively described in scientific language. The scientist, as both observer and language-user, can capture the external facts of the world in propositions that are true if they correspond to the facts and false if they do not. Science is ideally a linguistic system in which true propositions are in one-to-one relation to facts, including facts that are not directly observed because they involve hidden entities or properties, or past events or far distant events. These hidden events are described in theories, and theories can be inferred from observation, that is, the hidden explanatory mechanism of the world can be discovered from what is open to observations. Man as scientist is regarded as standing apart from the world and able to experiment and theorize about it objectively and dispassionately. (Hesse 1980, vii)

Enlightenment thinkers applied the new method to all disciplines. Not only the natural, but also the human, sciences—politics, ethics, metaphysics, and even philosophy and theology—came under the purview of the new science. In this way all fields of the human endeavor became, in effect, branches of natural science as it had been reoriented under the rubric of Cartesian foundationalism and Lockean empiricism.

In the world that emerged from the Enlightenment, theology found itself losing the exalted place it had once enjoyed, as the central role formerly played by the theologian became the prerogative of the scientist. This world assumes that the doctor aboard the *Voyager* gave the correct and only true diagnosis of what had actually saved Kess's life. If theology is to find a place in this world, it must fit in with the canons of empirical science. In short, theology must be able to present itself as scientific and scientifically credible. From the seventeenth century to the 1970s, theologians accepted this challenge.

"Scientific" Theology. One immediate theological response built from the interest in "natural" religion, those beliefs that were seemingly demonstrable by reason, in contrast to "revealed" religion, the more particular doctrines taught by specific religious communities, that accompanied the ascendancy of the empirical scientific method. The Protestant scholastics realized that the growing interest in natural theology required the establishment of a rational foundation for Christian theology, if it were to maintain its intellectual integrity and appeal. Consequently they undertook this task, believing that God was the author of all truth, whether it be philosophical or theological, and that therefore no proposition could be true

theologically if it were false philosophically. Armed with this assumption, these theologians freely made use of reason and philosophy in their theological endeavors (see Evans, McGrath, and Galloway 1986, 161). In the task of making Christian theology compatible with the new empirical science, John Locke became a powerful ally, for he argued that when divested of its dogmatic baggage Christianity was the most reasonable form of religion.[3]

Other Enlightenment theologians attempted to reduce religion to its most basic elements, which they believed to be universal and therefore reasonable. In the process they constructed a theological alternative to orthodoxy—the deism that played such an important part in the founding of the American republic.

Despite the work of the theologians, by the time the eighteenth century drew to a close, many intellectuals had abandoned even the religion of reason for either skepticism[4] or religious relativism.[5] The dawning of the nineteenth century, therefore, required new measures to insure a place for theology within the realm of science. The new breed of theologians agreed with their intellectual forebears that there was no going behind the quest for certainty introduced by Descartes; there was no return to a seemingly irrational appeal to external religious authority. Committed to the foundationalist agenda, these thinkers sought a new, intellectually unassailable bedrock upon which to construct the theological house.

For theology's sure foundation, some nineteenth-century theologians looked to religious experience, which, although personal in nature, is (they thought) nevertheless universally human. The attempt to construct theology on the basis of human religious experience became a specific concern of classical Protestant liberalism. Liberals portrayed the Christian faith in general and Jesus' life and teaching in particular as the fulfillment of humankind's highest religious (or moral) aspirations, aspirations that these thinkers thought they found engraved—albeit perhaps only in embryonic form—in (universal) human nature.

This, of course, once again opened avenues for conversation between theology and science. Claude Welch looks back on the liberal program and concludes that

> the really interesting theologies of the nineteenth century . . . were fully committed to positive mediation between the "gospel" and modern thought, to building bridges in the modern world, including bridges between theology and science . . . this endeavor . . . called specifically for profound respect for science and the scientific method, which was recognized as being rooted in the same Enlightenment spirit of criticism that had to characterize religious thinking. (Welch 1996, 33)

As this summary suggests, however, theologians assumed that the bridge-building task required that they continue the pattern set in the Enlightenment of taking their cue from the scientists. Hence, Welch admits that this massive nineteenth-century effort at mediation or synthesis was accompanied by "a demythologizing within theology, whereby theological

assertions take on new kinds of meaning" (Welch 1996, 37)—meanings, I might add, that in the end were determined above all by their compatibility with the modern scientific mind.

Like their liberal antagonists, conservative theologians also searched for a foundation for theology that could stand firm when subjected to the canons of empirical science. Conservatives came to conclude that this invulnerable foundation lay in an error-free Bible, which they viewed as the storehouse for divine revelation.[6] This inerrant foundation, in turn, could endow with epistemological certitude, at least in theory, the edifice the skilled theological craftsman constructed upon it. Conservatives such as the great Princeton theologian Charles Hodge grounded the error-free nature of Scripture in its divinely inspired character. Many others, however, boldly asserted that the Bible's special status as inspired, and hence the inerrancy of Scripture, could be justified by appeal to rational, scientific arguments, such as empirical evidence that the Bible contains prophecies that were subsequently fulfilled or that the various facts the biblical writers present are completely accurate.

Conservative theologians took their cue from the modern scientific method in their actual theologizing as well. Hodge and his followers viewed the theological discipline as a science, understood in the modern sense of the study of "the ordered phenomena which we recognize through the senses."[7] Hence, they believed that theology and science shared a common method (Stewart 1995, 26). Yet the method conservatives used in their work was not the product of their own careful *theological* reflection but had been bequeathed to them by the architects of modern empirical science. Consequently, like many conservatives of his day, Hodge patterned his approach after that of the scientist. Just as the natural scientist uncovers the facts pertaining to the natural world, he asserted, so the theologian brings to light the theological facts found within the Bible (Hodge 1872, 18). The conservatives' infatuation with the reigning scientific model also affected how they viewed the products of their labors; they assumed that the theological propositions they drew from the Bible stated universal, even eternal, facts, and that the chief goal of theology as an intellectual, scientific discipline was to compile these various facts.

The foundationalism of Hodge and other nineteenth-century conservatives set the tone for what would become the reigning theological program of evangelical theology throughout the twentieth century. According to evangelical theologians Gordon Lewis and Bruce Demarest, for example, the task of the theologian is to apply the scientific method, assisted by the canons of logic, to the deposit of revelation found in Scripture in an ongoing quest to compile the one, complete, timeless body of right doctrines, formulated as a series of statements or theological assertions, each of which is true in its own right (Lewis and Demarest 1987, 25–27). Similarly, the understanding of the Bible as a compendium of truths unlocked through "scientific"

induction, which came to characterize American fundamentalism (see Noll 1994, 98), lives on in Wayne Grudem's definition of systematic theology as the attempt to determine what the whole Bible teaches about any given topic (Grudem 1994, 21).

As I will note shortly, the postmodern critique has all but demolished the foundationalist program launched in the Enlightenment. Nevertheless, it has not halted theologians from following the pied piper of science, especially in providing the method for their own work. Remnants of the modern view are evident, for example, in Thomas F. Torrance's "theological science," with its focus on the "facts." He writes,

> In our day . . . there has taken place a powerful rehabilitation of *dogmatics* in the proper and original sense in which it can be applied to pure physics as well as to pure theology—i.e., the kind of knowledge that is forced upon us when we are true to the facts we are up against, and in which we let our thinking follow the witness of those facts to their own nature and reality, together with the kind of statements we are compelled to make in sheer recognition and acknowledgment of the nature of those facts. (Torrance 1969, 341)

Yet I must quickly add that Torrance's position is not simply that of the evangelical modernists. Although he speaks the language of facts and divine logic to which we have access as humans, his understanding of these terms and the ensuing theological task reveals a decidedly Barthian influence. Rather than looking to the canons of Western logic, Torrance states categorically that the "logic of God" can refer only to Jesus Christ, who is "the eternal *Logos* of God become flesh . . . the incarnate *Logic* of God, the Logic of God's Grace and Truth toward us" (1969, 205–6).

More significant, however, is the lingering presence of the modern program in the work of several self-declared postmodern, non- or postfoundationalist theologians who consciously attempt to bring into the theological enterprise methodological insights from contemporary science. Although differing in substance, these thinkers follow the lead of their modern predecessors in that they too give primacy to science and view the role of theologians in the ongoing interdisciplinary conversation as that of relating theology to science (van Huyssteen 1998, 132[8]).

A particularly lucid example of this tendency is Nancey Murphy's appropriation of Imre Lakatos's method of scientific research programs as the paradigm for theological inquiry. Lakatos argues that what we call science entails the process of testing particular hypotheses that are themselves members of a larger network held together by an overarching program that consists of certain methodological rules that guide the research process. Some of these rules indicate paths of research that ought to be avoided (the "negative heuristic" or "hard core" of the program), and others indicate directions the research should pursue (the "positive heuristic" or "protective belt" surrounding the "hard core"). At the center of a research program is a core theory (such as "the mechanistic theory of the universe—

according to which the universe is a huge clockwork [and system of vortices] with push as the only cause of motion" [Lakatos 1970, 132–33]). This core is not subject to direct testing. What researchers do instead is articulate auxiliary hypotheses that surround and preserve the core. These auxiliary hypotheses, in turn, connect with empirical data, to which we appeal to confirm or disconfirm them. Hence, the hypotheses "bear the brunt of tests and get adjusted and re-adjusted, or even completely replaced" (1970, 133). In short, then, a research program is an ongoing endeavor to preserve a core theory that lies at its heart and can be evaluated by its ability to explain the known facts and to anticipate new, novel facts (Murphy 1990, 59–60).

According to Murphy, the application of this model to theology requires that the theologian identify the theological research program's core theory and auxiliary hypotheses, as well as the empirical data that we might use to test the hypotheses (1990, 183–92). The empirical grounding that can help confirm the core theory, Murphy argues, is behavior that indicates that God is at work. She asserts that such theological, behavioral facts are objective and replicable, and as such they resemble the empirical facts to which science appeals to confirm scientific hypotheses (1990, 168).

The modern paradigm, which looks to empirical science as providing the method for theology, has yielded impressive results. By borrowing the scientific method, conservative theologians have constructed systems of Christian doctrine that have assisted generations of apologists in responding to the challenge posed by a world that from their perspective appears to deify science and is enamored with the scientific method. Similarly, by employing this method liberal theologians have been able to make intellectual peace with what they perceive to be a thoroughly secularized modern world. And thinkers of various theological affinities have artfully demonstrated the credibility of faith to a culture in which doubt has become the first principle of knowing.

Yet those who would adopt wholesale a method derived from science would do well to realize that scientists no longer agree as to what "the scientific method" in fact entails. Hence, John Polkinghorne notes, "it has proved impossible to distil the essence of the scientific method. Proposals such as making refutable conjectures (Popper), pursuing progressive research programmes (Lakatos), attaining empirical adequacy (van Fraassen) or pragmatic success (Rorty), capture aspects of the complex practice of science, but each falls far short of an adequate account" (Polkinghorne 1998, 105–6).

Further, in the process of paying homage to empirical science, theologians may be guilty of too readily conceding the autonomy of a particularly Western understanding of human rationality. But the day of the hegemony of Western scientific rationality appears to be waning, as increasing numbers of thinkers are becoming aware of the local, rather than universal, nature of both theology and science. J. Wentzel van Huyssteen notes

this well: "'theology' and 'science' never exist in such a generalized, abstract sense, but always only in quite specific social, historical, and intellectual contexts" (1998, 163). And Polkinghorne concludes that "the study of science encourages the recognition that there is no universal epistemology" (1998, 108).

Even more significant, however, is the possibility that the process of gaining some semblance of intellectual credence in a conversation whose ground rules have been determined by the scientific enterprise has actually robbed theology of its own "soul" (see, for example, Charry 1997). It is therefore not surprising that a growing number of theologians today are exploring alternatives to the reigning modern paradigm that looks to science for the method of theological inquiry and believes that theology is a valid intellectual endeavor only to the extent that it is able to take its place among the sciences.

The Medieval Paradigm: Theology Is the Queen of the Sciences

The demise of the naive realism that characterized modern empirical science has left theologians scurrying for alternative models of the relationship between theology and science and hence for the devising of a proper method for constructing a scientific theology. The contemporary shaking of the foundations has persuaded some thinkers to go behind the rise of the empirical scientific method and resurrect an older paradigm that dates to the Middle Ages. Under the impulse of this older medieval model, these theologians have reversed the order of methodological dependency, replacing the modern movement from science to theology with the proposal that theology assert its rightful place as giving direction to the scientific enterprise.

Why do theologians need to be scientists? Proponents of the refurbished medieval paradigm reply: "because theology is the queen of the sciences." Theologians, this view asserts, quite naturally are scientists, insofar as theology sets the tone for the scientific endeavor and integrates human knowledge into a composite whole. According to this model, what proved crucial in saving Kess's life was Janeway's faith and the power of the ancestral spirits. The ship's doctor merely indicated the physical means through which the miracle was accomplished.

The Paradigm in the Middle Ages. The view that theology is the queen of the sciences boasts a long history. Although its roots lie earlier, its heyday came in the high Middle Ages in connection with the revival of Aristotelian thought (Farley 1983, 35–38). Building from Aristotelian anthropology, the medieval thinkers viewed knowledge (*scientia*) as an enduring cognitive orientation and dexterity of the soul (*habitus*). Theology in turn, they argued, is also a *habitus*, a disposition of the soul that entails knowledge of God and is oriented toward personal salvation. But rather

than being given directly to the soul, knowledge of God emerges through a deliberate, intellectual exploration. For the medieval thinkers, then, theology is the cognitive discipline that gives rise to salvific knowledge of God.

Further, the medieval thinkers asserted that theology qualifies as a science in the Aristotelian sense. Like other cognitive disciplines it works from "first principles," and it attains knowledge through the process of demonstrating conclusions from such principles. For this reason, in the emerging medieval universities theology took its place among the Aristotelian scientific disciplines that yield knowledge, such as law, medicine, and the arts. Yet theology's place was not merely to be one science alongside the other sciences. Rather, the medieval theologians argued that theology deserves primacy over the others, because theology's first principles are of supernatural origin, and its subject matter is God. In short, theology is the queen of the sciences.

The grand exponent of this model was Thomas Aquinas, who is routinely hailed as the greatest of the medieval theologians. The relationship between theology and what he calls the philosophical sciences is the first issue that Aquinas explores in his *Summa Theologica*. Theology (*sancta doctrina*), understood as the quest for knowledge arising from divine revelation, is necessary in addition to the philosophical sciences, which focus on knowledge that can be obtained through reason, because the eternal truths required for human salvation exceed human reason and come to us only through revelation.

Despite its source in divine revelation, theology is to be numbered among the sciences, Aquinas maintains, because it too proceeds from first principles. At the same time, theology differs from the other sciences in one crucial aspect. Unlike sciences such as optics (whose principles are established by geometry) and music (which proceeds from principles established by arithmetic), the principles out of which theology emerges are "made known by the light of a higher science, namely, the science of God and the blessed," that is, theology "accepts the principles revealed by God" (Aquinas 1948, 1.1.2).

This distinction leads to theology's superiority over the philosophical sciences. It is superior, Aquinas argues, because of the "higher dignity" of its subject matter; it is the pursuit of knowledge of what transcends human reason (i.e., knowledge of God). Theology is also superior because of its greater certitude. Theology derives its certainty from "the light of the divine knowledge," which cannot err, in contrast to the errant "natural light of human reason." Finally, theology is superior because it is directed toward the highest practical goal, eternal beatitude, which is itself the ultimate end toward which "the ends of all the practical sciences are directed" (Aquinas 1948, 1.1.5). Hence, theology treats scientific topics in relation to the way in which the sciences bring humans to the perfect knowledge

of God, which Aquinas—following Aristotle—believed entails human happiness.

For Aquinas, theology is both practical and speculative. Yet it is, in his words, "more speculative than practical." Theology has this speculative bent because it is "more concerned with divine things than with human acts," and even when it deals with human acts it does so with a view toward our eternal beatitude, which is perfect knowledge of God (1948, 1.1.4). Aquinas's emphasis on theology as a speculative science paved the way for subsequent thinkers to elevate the speculative aspect, to the loss of the practical. This tendency was exacerbated when the Aristotelian conception of science gave way to the empirical science pioneered by Bacon and developed by Locke. As the new science rose in prominence, theology—now increasingly understood as a speculative discipline—was dethroned from its lofty position as the queen of the sciences.

The present interest in the interface between theology and science in the wake of the demise of foundationalism, however, has given the medieval proposal a new lease on life. But what kind of renewal of theology as the queen of the sciences might fit in the postmodern context? Few thinkers today follow Aquinas in his baptizing of Aristotle, nor do many build from his distinction between revelation and reason. Likewise, few theologians advocate continuing the medieval legacy in the ordering of the sciences. As T. F. Torrance declares,

> Certainly theology cannot and must not claim to be queen of the sciences in the old medieval sense, in which she is thought of as presiding over a hierarchy of *scientias speciales*, and therefore as supreme over all the sciences through which man seeks to understand and rule over the natural world in which God has placed him and given him his duties and tasks. (1969, 283)

Yet several prominent theologians have returned to another aspect of the medieval proposal, namely, the idea that theology brings the sciences together into a unified whole. In their view, theology serves as the queen of the sciences insofar as it explores how all human knowledge is unified and illumined through the Christian conception of God and the universe as the creation of God.

This aspect of the medieval model is evident, for example, in the work of the British mathematical physicist turned Anglican priest John Polkinghorne, who speaks of theology as "the great integrative discipline" (1996, 1). Philosophical theologian J. Wentzel van Huyssteen betrays a similar stance in his attempt to carve out a method of integrating theology and science in the emerging postmodern context. He writes,

> for Christian theology the ultimate postmodern challenge to its rationality and its credibility as a belief system can be stated as follows: do we still have good enough reasons to stay convinced that the Christian message does indeed provide the most adequate interpretation and explanation of our experience of God, and of our world as understood by contemporary science? Put differently: does it still make sense within a postmodern context to be committed to the fact that our evolving,

expanding universe, as we have come to know it through science, ultimately makes sense only in the light of Sinai and Calvary? (van Huyssteen 1998, 21–22)

The most thoroughgoing contemporary exposé of theology as the queen of the sciences, however, comes in the work of the German theologian Wolfhart Pannenberg.

Pannenberg and the Medieval Legacy. At the core of Pannenberg's theological agenda is his commitment to the public nature of theology. Pannenberg resolutely rejects the turn toward the believing subject he finds in much modern theology. He avers that theological statements cannot be grasped merely by "a decision of faith," for faith is not a way of knowing in addition to reason. Instead, theology is grounded in public, historical knowledge. For this reason Pannenberg declares that theology cannot be relegated to a private, sheltered sphere of life. Rather, theological affirmations are to be subjected to the rigor of critical inquiry into the reality on which they claim to be based. Theology, in other words, must be evaluated on the basis of critical canons, just as the other sciences are.

Pannenberg's understanding of the public nature of theology is motivated by certain crucial theological suppositions central to his thinking. He believes that in whatever form it is found, the human quest for truth is ultimately the quest for God. Here Pannenberg builds from the Augustinian linking of truth with God (Pannenberg 1991, 53). Because God is truth, all human inquiry has God as its ultimate subject matter. In proposing that God is the truth of the world, Pannenberg sees himself as standing in a long tradition dating to the early Christian apologists that equates the God of the Bible with the philosophical idea of God as the source of the unity of the world (1991, 70). This stance, in turn, leads to an engagement with science. If God is this unifying source, all truth must cohere in God. Hence, Pannenberg is convinced that the Christian understanding of God is crucial to the pursuit of knowledge.

The public nature of theology arises as well out of Pannenberg's innovative assertion that because God is the power that determines everything, God's deity is connected to the demonstration of God's lordship over creation. This means that the idea of God, if it corresponds to an actual reality, must be able to illumine not only human existence but also our experience of the world as a whole. In this way, the idea of God can provide unity to all reality. Pannenberg believes that in a secular world, this quest makes dialogue between theology and the scientific account of the universe inevitable. If God is the Creator of the universe, the world can be properly understood only when it is seen as the creation of God. This leads Pannenberg to see the overarching task of theology as that of showing the illuminating power of the Christian conception of God.

Following the medieval scholastics, Pannenberg undertakes the task of demonstrating the truth of Christian teaching through a representation of

its coherence both internally (the relation of the various topics of systematic theology to each other) and externally (its relation to other knowledge) (1991, 21–22). His belief that the theologian's task includes showing the coherence of Christian teaching with all human knowledge drives Pannenberg to engage with science. He believes that in a certain sense the failure to bring to light the illuminating power of the idea of God for scientific knowledge would mark the failure of the Christian vision of God and, consequently, the failure of the Christian God (Pannenberg 1981, 4).

Rather than following the Greeks in understanding truth as the constant and unchanging essences—the eternal presence—lying behind the flow of time, Pannenberg draws from the Hebrew idea that truth is essentially historical and ultimately eschatological. Truth is what shows itself throughout the movement of time climaxing in the end event (Pannenberg 1991, 54). Consequently, prior to the eschaton all human knowledge will remain provisional and all human truth claims contestable. All human attempts to set forth a coherent articulation of truth, he avers, remain an incomplete "thinking after" the divinely grounded unity of truth. Consequently, Pannenberg looks to the eschatological future as the focal point of ultimate truth.

The provisionality of knowledge leaves us in a situation in which alternative claims to truth compete with each another. In such a situation, Pannenberg concludes, theology takes on an apologetic dimension. He believes that the systematic reconstruction of Christian doctrine is itself a way of testing and verifying the truth claims of Christian revelation (1991, 257). Thus, in his estimation the best apologetic for the truth of the Christian faith is the demonstration of both the internal and the external coherence of Christian teaching, that is, the demonstration of the power of the Christian conception of God to illumine our understanding of reality.

Pannenberg pushes the matter further, however. He argues that the focal point of divine revelation is the historical process. On the world historical stage, conflicting truth claims are struggling for supremacy. And at their core, these claims are ultimately religious. Consequently, he anticipates that the religious orientation that best illumines the experience of all reality will in the end prevail and thereby demonstrate its truth value. For him, therefore, it is in the specifically *religious* history of humankind that truth emerges (1991, 167–71).

Pannenberg's reintroduction of the medieval focus on theology as informing the sciences has much to commend it. Yet at one point it seems to carry overtones of the modern paradigm. Despite his focus on the indeterminacy of knowledge Pannenberg conceives of theology as adding to our knowledge of empirical reality (Hefner 1997, 100). His proposal thus retains a potentially problematic objectivist orientation (Haugen 1997, 3), insofar as his vision of a public theology seems to require that thinkers bracket their faith stance when they enter the halls of the academy. Van

Huyssteen puts his finger on the potential tension here. Pannenberg, he argues, "fails to confront the vital question of the intrinsic role of the theologian's subjectivity (his *ultimate commitment* and its conceptualization) in the theorizing of this theological reflection" (van Huyssteen 1997, 369). Hence, van Huyssteen suspects that Pannenberg may be caught in a dilemma between critical rationalist demands for noncommitment and the theologian's subjective religious commitment.

Despite this possible difficulty, Pannenberg indicates certain crucial aspects of the way forward. While he does not take this seemingly obvious step, his perspective suggests that in a sense the scientific portrayal of the universe is also fundamentally religious in tone. This means that the dialogue between theology and science does not pit faith against reason, or the religious against the secular. Rather, it entails a discussion between alternative (if not rival) views of reality. Philip Clayton recently asserted that "theology is one of many semantic worlds or 'meaning-complexes' that individuals and societies can draw on in their attempt to understand human existence" (1997, 402). Clayton's description would characterize science equally well.

The Postmodern Paradigm: Science Is Theology

One of the most far-reaching developments in recent intellectual history is the widespread questioning, and even wholesale dismantling, of the assumption of the objectivity and neutrality of the scientific method that reigned in the modern era. Van Huyssteen pinpointed the situation aptly: "the theology and science discussion in our time has been characterized . . . by a rejection of reductionism and a new awareness of the hermeneutical dimension of science" (1997, 41). Indeed, the twentieth century has witnessed the emergence of a postempirical philosophy of science, a development that requires a rethinking of our query, "Why do theologians need to be scientists?"

Postempirical Philosophy of Science. Armed with the scientific method, modern scientists busied themselves with the task of unlocking the mysteries of the universe and in the process celebrated discovery after discovery. Yet even as science was enjoying its greatest triumphs, certain aspects of the modern scientific world view were shaken from within (Peacocke 1989, 57). The most far-reaching internal challenge came from physics, the discipline that had provided the firmest foundation for the modern scientific edifice. Developments in the early twentieth century such as quantum theory, relativity theory, and Heisenberg's uncertainty principle undermined not only the mechanistic model of the world but also earlier assumptions about scientific objectivity and certitude,[9] together with the ability of science to delve into the "deepest secrets" of creation (Miller 1989, 10) or to gain unambiguous knowledge of the universe (Arecchi 1992, 351).

The findings that subverted the older understandings of the nature of the universe also led to a shaking of once sacrosanct views of the scientific method itself, as a chorus of philosophers of science challenged scientific positivism as well as the linear conception of the rise of scientific knowledge. Many voices have been involved in this critique,[10] including Norwood Hanson (1958) and Paul Feyerabend (1975). But perhaps the most seminal work has been Thomas S. Kuhn's *Structure of Scientific Revolutions* (1970).

Kuhn argues that foundational shifts in theory are not simply logical modifications or reinterpretations of past knowledge. Nor do scientists simply add one fact to another. Rather, science is a dynamic historical phenomenon. Shifts in theory come as radical transformations in the way scientists view the world. Hence, science lurches ahead in sudden creative bursts or "paradigm shifts."

The work of Kuhn and others has resulted in an increased recognition that the foundations of scientific discourse, and hence scientific "truth," are in some sense communally determined. Science is not merely the neutral observation of data (Kuhn 1970, 126). Nor does science lead us to definitive statements about the world as an objective reality "out there." In fact, one recent theory, the Duhem-Quine thesis, denies that an experiment can test a theoretical prediction in any final way. Because the test itself depends on the validity of the various theories that support it (see Collins 1989, 88), any experiment rests ultimately on a network of theories, opinions, ideas, words, and traditions—that is, on the culture (Anderson 1990, 77) or the community—in which it takes place. Scientific knowledge is therefore a collection of research traditions borne by particular communities of inquirers. Any scientific paradigm involves the constellation of beliefs, values, and techniques shared by the members of a given community. More specifically, it is the belief system that prevails in a certain scientific community at a certain time in history. And scientific discourse—the scientific "language game," to use the well-known term coined by Ludwig Wittgenstein[11]—is largely unintelligible outside the lived practice of such communities (Bellah 1989, 76).[12]

Kuhn adds yet another important twist. Paradigms do not merely direct the scientific enterprise; they also constitute the world of the scientist (Kuhn 1970, 110). The reigning paradigm determines what scientists see when they look at the world and influences even the operations and measurements that scientists choose in conducting experiments (1970, 126). Kuhn writes, "Examining the record of past research from the vantage of contemporary historiography, the historian of science may be tempted to exclaim that when paradigms change, the world itself changes with them" (1970, 111).

From here it is a short jump to the conclusion that a paradigm entails a social construction of reality (1970, 175). Indeed, Kuhn's work occasioned an attempt to apply insights from sociology, especially the newer sociology

of knowledge, to the scientific enterprise. The result was an upstart enterprise known as "the sociology of scientific knowledge," which explores the socially contextualized nature of scientific theories. Some proponents of this approach have drawn radically relativistic conclusions from their findings. Michael Mulkay, to cite one example, declares,

> Scientific knowledge, then, necessarily offers an account of the physical world which is mediated through available cultural resources; and these resources are in no way definitive. The indeterminacy of scientific criteria, the inconclusive character of the general knowledge-claims of science, the dependence of such claims on the available symbolic resources all indicate that the physical world could be analysed perfectly adequately by means of language and presuppositions quite different from those employed in the modern scientific community. *There is, therefore, nothing in the physical world which uniquely determines the conclusions of that community.* It is, of course, self- evident that the external world exerts constraint on the conclusions of science. But this constraint operates through the meanings created by scientists in their attempt to interpret that world. These meanings, as we have seen, are inherently inconclusive, continually revised and partly dependent on social context in which interpretation occurs. If this view, central to the new philosophy of science, is accepted, there is no alternative but to regard the products of science as social constructions like all other cultural products. (Mulkay 1979, 60–61)

He then adds, "Of course, we would hardly expect any other conclusion, for one of the central claims of the revised view is that scientific assertions are socially created and not directly given by the physical world as previously supposed" (p. 62).

Since the 1970s, the appraisals of sociologists of science such as Mulkay have been questioned (see, for example, McMullin 1981b, 301–2). Yet in the emerging postempirical understanding, science no longer looms as a haven of objectivity in a sea of cultural relativity. Few philosophers of science today deny that there is both a personal and a social dimension in the scientific enterprise. The scientist is no longer seen as merely a passive receptor of data but as one who comes to the noetic situation with a particular preunderstanding. As Werner Heisenberg declared earlier in the century, "Natural science does not simply describe and explain nature; it is part of the interplay between nature and ourselves; it describes nature as exposed to our method of questioning" (Heisenberg 1959, 75). And the scientist's observation will be colored and affected by his or her own perspective, including social location, culture, ideological commitments, prior experiences, and even gender. Thus, as Thomas Guarino lucidly concluded, "even the scientist must always be called an interpreter and creator as well as an observer" (Guarino 1993, 316). In short, postempirical philosophy of science has led to a chastened view of science. No longer tempted by the naive realism that characterized the modern era, scientists now generally view their proposed theories and models as "candidates for reality," to cite Arthur Peacocke's descriptor (Peacocke 1989, 25), rather than as simply reflections of reality itself.

In other words, we might say that the postempirical understanding has

led to the realization that scientists resemble theologians. As biochemist Jeffrey Wicken poignantly declared, "Everyone who does theoretical science seriously *is* a theologian" (Wicken 1997, 256). This observation leads to a third paradigmatic answer to our question, "Why do theologians need to be scientists?" Theologians need to be scientists because scientists are theologians. But in what sense?

The Scientist as Theologian. The postempirical understanding has led to the realization that the scientific enterprise is not simply the accumulation of facts that are "out there" waiting to be discovered by neutral, dispassionate observers. Rather, scientists must (and quite naturally do) bring a type of faith to their endeavors. T. F. Torrance, echoing the important work of Michael Polanyi, describes what he sees as a significant turn in science, a turn to viewing the discipline as "faith seeking understanding." In this new view, "faith is . . . recognised again as the very mode of rationality adopted by reason in its fidelity to what it seeks to understand, and as such it constitutes the most basic form of knowledge from which all subsequent inquiry proceeds" (Torrance 1989, 75).[13] Similarly, various thinkers now acknowledge that religious convictions play a role in the development and assessment of scientific theories (Wildman 1996, 52).

Scientists are theologians, then, in that personal stance affects, even directs, their research, as theorists such as Polanyi (1958) suggest. Like theologians, scientists engage in their discipline as persons of faith. They bring a certain type of personal commitment—that is, faith—to their work.

Of course, this assumes that theologians engage in their discipline from a faith perspective. In the modern era this perspective was overshadowed by the assumption that theology was an academic discipline after the pattern of the sciences and therefore could be practiced by anyone who displayed the necessary intellectual skills. One of the ironies of recent intellectual history is that just when scientists are increasingly becoming theologians, many theologians are struggling even harder to remain scientists. The postempirical context, however, provides an appropriate occasion to rediscover the faith dimension in both science and theology.

The common element of faith in all human intellectual endeavors leads to a second conclusion arising out of postempirical philosophy of science. Scientific knowledge and religious knowledge are not diametrically opposite, mutually exclusive genres, but are of the same order (Richardson and Wildman 1996, 85). This conclusion initially came as the outworking of the realization that the universe is a more "mysterious" place than the empirical scientists of the modern era realized. Because the natural world is not a simple, closed network of causal relations, the older model of science is not capable of explaining it completely (p. 86). For this reason, in offering their models of the universe, scientists repeatedly cross over the boundaries that traditionally divided their discipline from the realm of theologians.[14] In essence, they *become* theologians.

This realization has led many thinkers to call for a new partnership between theology and science in the task of understanding the world (p. 86). In this new engagement, theologians and scientists bring to the table their own unique contribution without either discipline attempting to provide the standard for the other. Through this conversation, scientists and theologians offer insights that enrich each other's work.[15] Some thinkers even see signs of a new "physico-theology" taking shape (Worthing 1996, 204).

As significant as these two observations are, however, they do not take us to the heart of the manner in which scientists are theologians, and therefore why theologians must be scientists. To get there, we must consider again the installment of *Star Trek: Voyager* that I cited before. The episode provides an interesting postmodern twist to the discussion of the relationship between theology and science, for it characterized the aliens and the ship's doctor as inhabiting two distinct worlds. Being the product of cultural myths and religious beliefs, the world of the aliens quite naturally included spiritual entities who had the power to affect physical beings. The doctor, in contrast, inhabited the supposedly objective world of modern science, which has room only for physical beings and physical causation. The episode leads the viewer to conclude, however, that the second world is no less a created realm than the first.

At this point, many scientists would likely demur from this analysis by claiming that they do not devise social constructions of the world but really *are* engaging in the task of discovering a universe that is an objective, external reality. While perhaps admitting the social dimensions of scientific theories, contemporary critical realists adamantly maintain that scientific theories seek to approximate a natural world that actually exists apart from scientific descriptions of it. Ernan McMullin, to cite one example, maintains that "the long term success of a scientific theory gives reason to believe that something like the entities and structure postulated by the theory actually exist" (McMullin 1984, 26).

Critical realists do have a point. There is a certain undeniable givenness to the universe. Yet we do not (yet) live in the universe as a given, external reality. We do not inhabit the world-in-itself. This principle operates on several levels.

Norwood Hanson points out that we live in a world of our own construal. He indicates that seeing and construing are not two separate epistemological moments but that "the construing is there in the seeing." As an example, Hanson sets up an imaginary scene in which two astronomers, Johannes Kepler (who regarded the sun as fixed) and Tycho Brahe (who, following Ptolemy, believed the earth was fixed), watch the dawn from a hill. Hanson asks, "Do Kepler and Tycho see the same thing in the east at dawn?" In response he declares, "Tycho sees the sun beginning its journey from horizon to horizon. He sees that from some celestial vantage point the sun (carrying with it the moon and planets) could be watched circling our

fixed earth. . . . Kepler will see the horizon dipping, or turning away, from our fixed local star. The shift from sunrise to horizon-turn is . . . occasioned by differences between what Tycho and Kepler think they know" (Hanson 1958, 23–24).

Not only do we inhabit a world of our own construal, we also live in a linguistic world of our own making. Hence, scientists engage in world construction because they offer linguistic models and expect others to inhabit the world as they describe it.

Although Wittgenstein introduced the term *language game* into popular parlance, the Swiss linguist Ferdinand de Saussure (1857–1913) provided the basis for the turn to linguistics. In contrast to his predecessors, who viewed language as a natural phenomenon that develops according to fixed and discoverable laws, Saussure proposed that a language is a social phenomenon and that a linguistic system is a product of social convention (Holdcroft 1991, 7–8, 10). Structuralists, such as the anthropologist Claude Levi-Strauss (b. 1908), and the proponents of the sociology of knowledge built on Saussure's insight. The result was an awareness of the role of culture (including language) in both personal identity formation and the construction of linguistic worlds (Berger and Luckmann 1967, 99–104[16]).

Basically, sociologists argue that culture generates a shared context in which a people engage in the construction of meaning and the task of making sense out of the world. Hence, Peter Berger, to cite a formative example,[17] argues that the world we inhabit is not simply given, not merely prefabricated for us. Rather, we are world builders. We live in a sociocultural world of our own creation. This constructed world attains for us the character of objectivity, in the sense of both seeming to be external to our personal consciousness and being experienced with others (Berger 1969, 3–13). According to Berger, world construction entails above all the imposition of a meaningful order (a *nomos*) upon our variegated experiences. The ordering of experience involves language and knowledge, the latter of which Berger understands not as objective statements about the universe as it actually is but the "common order of interpretation" that a society imposes on experience (Berger 1969, 20).

In this process culture is important. Raymond Williams points out that culture functions as a "*signifying system* through which necessarily . . . a social order is communicated, reproduced, experienced and explored" (Williams 1982, 13). Language, which we inherit from our social context—together with nonlinguistic modalities, such as metaphorical images and symbols—provides the conceptual tools through which we construct the world we inhabit, as well as the vehicles through which we communicate and thereby share meaning with others. In the words of Peter Berger and Thomas Luckmann, "Language objectivates the shared experiences and makes them available to all within the linguistic community, thus becoming both the basis and the instrument of the collective stock of knowledge"

(1967, 68). The "universe" we inhabit, then, "is a socially constituted reality, which the individual member of society learns to take for granted as 'objective' knowledge about the world" (1963, 423). And the language of empirical science—like the language of religious myth—is one such world-constructing grammar.

But we must take this insight one step further. As a world-constructing grammar, the language of science is not merely *like* the language of religious myth; ultimately it functions *as* such a language. Berger argues that throughout human history, religion, defined sociologically as "the human enterprise by which a sacred cosmos is established" (Berger 1969, 25), has played "a decisive part in the construction and maintenance of universes" (Berger and Luckmann 1963, 422). Religion legitimates the socially constructed world that participants in any society inhabit. Religion does this by locating a society and its institutions within a sacred and cosmic frame of reference, by bestowing on the participants in a society a sense of being connected to ultimate reality, and by giving cosmic status to the *nomoi* (or common orders of interpretation) of that society (Berger 1969, 32–36).

This world-constructing and legitimating function is not limited to religious traditions, however. To allude again to the *Star Trek: Voyager* episode, the scientific realm of the doctor is no less the construction of a religious vision than is the realm of the alien religionists. Thus, science likewise legitimates its socially constructed world and mediates cosmic status to the *nomoi* of a scientifically oriented society. In this manner, science fulfills sociologically a religious role. In short, postempirical philosophy of science leads to the conclusion that the empirical world of the scientist is a construction, and this constructed world is "religious" in orientation. In constructing a "scientific universe" (Weizsäker 1952, 123), the scientist *is* a theologian.

Conclusion: Theology and Science, and the Construction of the World

Does this insight require that we give up all sense of an objective universe existing "out there"? Are we left with nothing but our socially constructed worlds? Should we then become complete cultural relativists? Not necessarily. As has been noted throughout church history, the Christian perspective does assume a certain objectivity to the world. But the objectivity we can attribute to the universe is not that of a static reality existing outside of, and cotemporally with, our socially and linguistically constructed reality; it is not the objectivity of what some might call "the world as it is." Rather, the objectivity set forth in the biblical narrative is the objectivity of the world as God wills it, as is suggested in the petition of the Lord's Prayer, "Your will be done on earth as it is in heaven" (Matthew 6:10 NIV).

The universe as God wills it, however, the realm in which the divine will is actualized, is not a present but a future reality (e.g., Isaiah 65:17–19;

Revelation 21:5). Therefore, the objectivity of the world about which we can truly speak is an objectivity of a *future*, eschatological world. The objective universe is the universe that one day will be. It is nothing short of a *new* creation. Because this future reality is God's determined will for creation, as that which cannot be shaken (Hebrews 12:26–28), it is far more real—and hence more objective—than the present world, which is even now passing away (1 Corinthians 7:31). This biblical perspective leads to what we might call an eschatological realism. There is a real universe out there. But this reality lies before rather than beneath or around us. And it is discovered through anticipation, and not merely through experimentation.[18]

A commitment to eschatological realism gives shape to our understanding of our shared human task. As God's image bearers, we have a divinely given mandate to participate in God's work of constructing a world in the present that reflects God's own eschatological will for creation. Because of the role of language in the world-constructing task, this mandate has a strongly linguistic dimension. We participate with God as through the constructive power of language we inhabit a present linguistic world that sees all reality from the perspective of the future, real world that God is bringing to pass.

But what linguistic tools are appropriate for use in our world-construction task? The answer lies in another aspect of the divine eschatological world. It is a realm in which all creation finds its connectedness in Jesus Christ (Colossians 1:17), who is the *logos* or the Word (John 1:1), that is, the ordering principle of the cosmos as God intends it to be. The centrality of Christ in the eschatological world of God's making suggests that our world-constructing grammar is nothing less than the narrative of Jesus given in Scripture. Further, the dynamic in the construction of this linguistic world is the Holy Spirit, who by speaking through the Scriptures creates the eschatological world in, among, and through us. The Spirit seeks to bring us to view all of life in accordance with God's creative program in fashioning a universe in accordance with Jesus Christ, the eternal Word.

In this task, both theology and science play important roles. Through the use of linguistic models[19] that they devise, explore, and test, practitioners of both disciplines construct a particular world for human habitation. For its part, theology explores the world-constructing, knowledge-producing, identity-forming language of the Christian community. The goal of this enterprise is to show how the Christian mosaic of beliefs offers a transcendent vision of the glorious eschatological community God wills for creation and how this vision provides a coherent foundation for life-in-relationship in this penultimate age. In so doing, theology assists the community of Christ in its mandate to be the sign of the age to come.

But what is the role of science when understood in this context? I have argued that the scientist as well as the theologian creates a particular world.

This observation suggests that our question could better read, What kind of a world *should* science be creating? The clue to the answer lies in the widely held conclusion that ours is an evolving universe and hence that scientists study a universe that is in the process of being created.[20] Viewed from the perspective of Christian theology, this suggests that science devises models of a universe that is the embryo of the eschatological new creation. In so doing, science gives evidence to proleptic experiences and dimensions within the present of the future new creation that God is already in the process of fashioning.

Why, then, do theologians need to be scientists? Because theologians, together with scientists, are in the construction business. They engage in the work of linguistic world construction. Theologians and scientists draw from their unique grammars to build a linguistic world for human habitation in the present. Understood in the context of Christian eschatological realism, the world they construct finds its basis in the new creation that God is already bringing to pass. As they do this, in unique yet complementary ways, scientists are theologians, and theologians in turn must be scientists.

NOTES

1. This opinion is voiced, for example, by Descartes's translator, Laurence J. Lafleur (Descartes 1960, vii, xvii).
2. Peacocke indicates that this view "held sway from the 1920s to the 1970s"; yet its genesis lies in the work of Locke (Peacocke 1989, 16).
3. Hence, Locke sought to demonstrate the existence of God in such a manner that this postulate carried mathematical certainty (Evans, McGrath, and Galloway 1986, 191).
4. David Hume was the exemplar of enlightened skepticism. For a discussion of this development, see McGiffert 1911, 230–51.
5. Paradigmatic was the position of Gotthold Lessing. For a summary of Lessing's views, see Placher 1983, 249–50.
6. Charles Hodge, for example, asserted that the Bible is "free from all error, whether of doctrine, fact, or precept" (Hodge 1872, 152).
7. For a discussion of this definition, formulated by Charles Hodge but indicative of other nineteenth-century conservatives, see Marsden 1983, 245–47.
8. Van Huyssteen here consciously echoes Polkinghorne (Polkinghorne 1998, xi).
9. A perplexing illustration of this is the famous Paradox of Schrödinger's Cat (Matthews 1992, 148–49.
10. Although commonly associated with positivism, Karl Popper pointed out that science is not simply a rational enterprise but ultimately depends on the exercise of the creative human imagination, which often works in a nonlogical manner. See Miller 1989, 11–12. For a helpful critical analysis of the movement away from positivism, see Stanesby 1985.
11. Midway in his career, Ludwig Wittgenstein (1889–1951) came to realize that rather than having only a single purpose—to make assertions or state facts—language has many functions (to offer prayer, make requests, convey ceremonial greetings, and so on). This discovery led to Wittgenstein's important concept of *language games*. According to Wittgenstein, each use of language occurs within a separate and seemingly self-contained system complete with its own rules. As when playing a game, we require an awareness of the operative rules and significance of the terms within the context of the purpose for which we are using language. Each use of language therefore comprises a separate language game. And each game may have little to do with the other language games. See, for example, Wittgenstein 1953, 32.
12. Van Huyssteen offers this summary of the direction philosophy of science has been moving in the days since Kuhn's landmark book: "Postmodern science, however, finds its best

expression in postpositivist, historicist and even post-Kuhnian philosophies of science, which have revealed the theory-ladenness of all data, the underdetermination of scientific theories by facts, and the shaping role of epistemic and non-epistemic value-judgments in the scientific process. Postmodern philosophy of science also reveals the narrative and hermeneutical dimension of science to us by acknowledging that science itself is a truly cultural and social phenomenon. This not only results in the cross-disciplinary breakdown of traditional boundaries between scientific rationality and other forms of rational inquiry, but also in the inevitable move from being objective spectators to being participants or agents in the very activities that were initially thought to be observed objectively. . . . Epistemologically this is ultimately recognized as the turn from foundationalism to holism, but also as the move away from a modernist notion of individualism to the indispensable role of the community in postmodern thought" (van Huyssteen 1998, 15–16).

13. Likewise, Paul Davies concluded that "even the most atheistic scientist accepts as an act of faith that the universe is not absurd, that there is a rational basis to physical existence manifested as a lawlike order in nature that is at least in part comprehensible to us. So science can proceed only if the scientist adopts an essentially theological worldview" (Davies 1995, 32).

14. Torrance noted one obvious, albeit elementary, aspect of this: "We have now moved beyond the old idea that natural science is concerned only with the *how* and not with the *why*; that is, with mechanical processes and not with ends; whereas theology is concerned only with *why-questions*: that is, questions about beginnings and ends. . . . It is now evident . . . that the *how* questions and the *why* questions cannot be finally separated" (Torrance 1989, 24–25). Examples of this invasion of theology by contemporary scientists include Robert Jastrow, Stephen Hawking, Frank Tipler, and John Polkinghorne.

15. For a summary of how physics offers challenges to theology, see Worthing 1996, 199–206.

16. For a fuller statement of Berger's views, see Berger 1969, 3–51.

17. For a summary and appraisal of Berger's contribution, see Wuthnow 1992, 9–35.

18. It is for this reason that scientific eschatology needs the counterbalance of theological eschatology. For a summary of eschatology as a topic of conversation—and divergence—between theology and science, see Worthing 1996, 159–98.

19. For a helpful summary of the contemporary discussion of models in both science and theology, see Peacocke 1989, 29–34, 40–44; Barbour 1990, 41–51.

20. For an example of a theological appropriation of this contemporary understanding, see Schmitz-Moormann 1997, 27–49.

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