

Chapter 2

Science, Religion, and Psychology

Modern discussions about the relationship between psychology and religion are now over a century old. However, this dialogue is part of a more general conversation between science and religion that goes back hundreds of years. This general discussion provides a broad context for our study that is important in a couple of ways. First, it helps us better understand a number of problematic issues that have appeared in the psychology and religion dialogue. Second, it helps us to better understand the nature of science, including the strengths and limitations that any scientific discipline like psychology will bring to a conversation with another field of human endeavor.

In this chapter, we introduce some basic philosophical concepts that are involved in discussions about the nature of science. We will then look at how ideas about science have changed over time and the affect of these shifts on the relationships between religion, science, and psychology. We will see that the philosophy of science one adopts will have a large impact on whether science and religion are seen as partners or competitors. It will also become apparent that perceived conflicts between science and religion are mostly based upon philosophies of science that are problematic and have been rejected in contemporary thought.

2.1 Philosophical Concepts and Issues in Science and Religion

2.1.1 *Empiricism*

Any understanding of science must begin with the fact that it is an empirical endeavor. Empiricism is a philosophical position related to **epistemology**, a branch of philosophy that considers the ways we gain knowledge about the world and ourselves. **Empiricism** is the view that knowledge should be based on experience. It is often contrasted with **metaphysics**, an inquiry into the basic nature of the world that relies primarily on reasoning rather than experience. While metaphysics is thought to be desirable and necessary by many scholars (particularly in philosophy), empiricism is generally taken to be a fundamental beginning point for science, including scientific explorations of religion (Hawley, 2006; Helminiak, 1996). **Scientific**

empiricism limits the kinds of experiences that can be considered a basis for knowledge, excluding things that do not fit comfortably within a framework of scientific investigation (MacIntyre, 1984, pp. 80–81). Psychology generally adopts an epistemological position of scientific empiricism and tends to limit acceptable experience to things that can be directly observed by an investigator. Opponents of this strict scientific empiricism point out that many important aspects of the human person—including religious experiences—cannot be directly observed. Thus, scientific empiricism makes knowledge about some aspects of the human self difficult or impossible to acquire (Willard, 1998).

Scientific empiricism often makes the assumption that the experiencing observer is completely impartial and detached from the phenomenon being studied. This assumption is a touchy issue in the psychological study of religion, as many psychologists have personal commitments to a religious tradition or secular atheism. Proponents of the detached observer assumption argue that the religious convictions of investigators cause difficulties as they can lead to theory or research intended to defend religion rather than just explain it (Beit-Hallahmi, 1985). Opponents of this view argue that personal religious experience and involvement is essential for understanding religion and that in any event complete detachment of the observer from the subject is impossible (Vergote, 1998).

Empirical work in science is thought to take place at different levels of observation, with different scientific disciplines focusing on different levels. Many scientists consider physics to be the fundamental level of observation because it studies the basic components and characteristics of matter and energy. Successively higher levels of observation include chemistry, biology, psychology, and sociology. Some writers would consider spirituality as another level for empirical investigation above psychology and sociology.

2.1.2 Reductionism

Reductionism is a process of simplification used in science. It is an essential part of human life. Our minds are constantly sorting through the vast amount of internal and external information available to us. Through selective attention and simplification, this is reduced to a manageable quantity so that we can make sense out of the world. However, reductionism takes different forms, often with important implications for how we think about and study a phenomenon of interest. Nancey Murphy (1998c) identifies five kinds of reductionism (Fig. 2.1):

1. **Methodological or atomistic reductionism** is the simplification of a phenomenon for the purpose of study, typically by breaking it into parts. For instance, one might define religiousness in terms of worship service attendance and the performance of religious practices like prayer, and then study how each of these relates to some other variable such as mental health. The opposite of atomistic reduction is **holism**, the idea that “the underlying unity of the world is not only a matter of derivation from common underlying principles, laws and constants, but extends also to a common interrelatedness and interconnectedness” (Peacocke, 1993, p. 42).

Fig. 2.1 *Nancey Murphy.*
With earned doctoral degrees in both philosophy of science and philosophy of religion, she is one of the most important figures in the science and religion dialogue. Photo courtesy of Nancey Murphy



According to this view, things are not merely the sum of their parts but also have an additional quality due to complex interrelationships (Slife & Hopkins, 2005; for an opposing view see e.g., Dawkins, 1987, p. 81). Atomistic and holistic perspectives are both helpful and do not necessarily exclude each other, but a rigid methodological reductionism can be quite limiting, especially when combined with other versions of reduction (Peacocke, 1993, pp. 39–40; Barbour, 1997, p. 230).

2. Epistemological reductionism is the idea that laws governing higher level, complex phenomena should follow from laws at lower levels (Stoeger, 2002). In this view, the laws of human behavior and human activities like religion should be similar to and deducible from the laws of biology and physics. This could also mean that the *methods and approaches* used in the study of biology or physics are also those that should be used in psychology. A scientist taking this position might argue that neuroimaging of brain functioning could deduce laws that could explain religious experience and behavior. An opposing position (e.g., MacIntyre, 1992) argues that it is not appropriate to equate psychological knowledge with knowledge in the physical sciences and that psychology needs to be free to pursue methods more in keeping with its subject matter.

Other critics who reject strict epistemological reduction often believe that different levels of organization have unique or **emergent properties** because of their complexity, and that these emergent phenomena cannot be derived or understood from the study of lower levels (Davies, 1998, p. 159; Murphy, 1998c; Marras, 2006; cf. Kim, 2006). In this view, there are connections between higher and lower levels of the system, and lower levels may be necessary to the operation of higher levels, but higher levels also have their own unique properties (Ellis, 2002; Baldwin, 1902,

p. 8; cf. Andler, 2006). For instance, many authors believe that human psychology and sociology have patterns that cannot be understood solely by looking at biology. Emergent properties can change the behavior of both the parts of the system and the systems as a whole in fundamental ways. For instance, carbon atoms are different when part of diamond or graphite, and it is impossible to understand the difference unless we consider not only the carbon atoms but the nature and quality of their interrelationships (Slife & Hopkins, 2005; Birch, 1998, p. 241). So while different levels of observation like psychology and biology certainly relate to each other, and we can work toward an understanding of their connectedness (Goldsmith, 1994, p. 141), we cannot ignore differences and unique emergent features in our study of the world. This view of things is congruent with holism. Some scholars view human consciousness and freedom—perhaps even the very experience of personhood—as emergent properties of complex neuronal networks in the brain (Hefner, 1998; Davies, 1996; Varela, Thompson, & Rosch, 1991; Peacocke, 2002).

3. **Logical or definitional reductionism** holds that the vocabulary and language used at one level of scientific inquiry should be able to be exactly translated into the language of another level. While many early theorists like William James and Carl Jung rejected this idea, much research in the psychology of religion accepts this principle and assumes that religion can be explained using the same psychological constructs used to explain other human behavior. This kind of reduction can also be found when scientists apply human language to nonhuman objects or bodily organs, as when evolutionary biologist Richard Dawkins (1989) labels genes as “selfish” or a psychologist incorrectly attributes things like action or language to the brain that are really activities of the whole person (Bennett & Hacker, 2003). An alternative view is that different levels of inquiry require a different kind of language and that descriptions at one level are somewhat unique. In this perspective, a psychological word like “willpower” cannot be translated entirely into neurological description.

4. Many philosophers of science see reality as operating at various levels: basic levels such as the subatomic or molecular level studied by physicists or chemists and higher levels that involve more complex biological and human systems studies by biologists or psychologists. **Causal reductionism** says that events at “lower” levels such as physics determine what happens at “higher” levels like psychology. This is also referred to as **bottom-up causation**. Less strict views of causal reduction suggest that levels are partly decoupled from each other and have some relative autonomy or that **top-down causation** can occur where higher levels influence activity at lower ones, a possibility implied in holism. For instance, a top-down causal view would suggest that subjective mental events such as religious experiences could influence chemical processes in neurons (Campbell, 1974; Peacocke, 1993, p. 53, 1995; Murphy, 1998c; Peters, 1996). In psychology, a strict causal reductionist might hold that our psychological life is completely determined by our biology. Those holding a decoupled view (e.g., Barrett, Dunbar, & Lycett, 2002, p. 2) would disagree, arguing that while biology is relevant to human nature, our personhood cannot be reduced to biology. Holistic or top-down theorists, who contend that mental activity can affect biological processes, also reject strict causal reductionism. In their view, full knowledge of the human person must involve an understanding of

both bottom-up and top-down causal processes. Knowledge at one level illuminates other levels without replacing them (Stoeger, 2002; Faucher, 2006).

Nancey Murphy has described the relationship between levels in the hierarchy as a **supervenience relationship** (Murphy, 1998c). In this type of relationship, (a) lower level events can constitute higher level events in given sets of circumstances but not in others, and (b) there is more than one pattern of lower level events that can lead to any given higher level event. The relation between depression and biology offers a good example of this. A person with cancer (a lower level biological condition) might feel depressed (a higher level psychological condition), if they knew that there is little chance for recovery but might feel no depression if they knew there was an easy cure for the disease. In addition, there are numerous biological conditions (e.g., drug use, hormonal irregularities), which can lead to the same psychological condition (depression). Thus there is no automatic link between lower level and higher level properties—they are related but somewhat independent of each other.

5. Ontological reductionism is the most extreme kind of reduction. It assumes that something has no real or unique existence—it is “nothing but” a combination of other types of things that are real. For instance, social psychologists who emphasize that religion is a cultural and psychological phenomenon might try to say that religion is only “our own creation, an illusion invented by society to curb self-gratification and to meet our desperate need for comfort and direction,” (Batson, Schoenrade, & Ventis, 1993, p. 370). This type of ontological reduction turns “explaining” religion into “explaining away” religion (Pargament, 2002b). Another example is **ontological materialism**, the position that all things are ultimately and only material objects. Since ontological reductions cannot be proven empirically, they are metaphysical positions, assumptions that philosophers and scientists make about the nature of the world and our experience.

Many scientists and philosophers reject ontological reductionism as unhelpful, untrue or scientifically unjustified. While seldom found in the physical sciences it appears more frequently in psychology, including some work in the psychology of religion. Extreme ontological reductionism is rarely accurate, particularly in the biological sciences, although it can have considerable heuristic value (Polkinghorne, 1999a; Corveleyn, 1996; Watts, 2002c, p. 4; Kistler, 2006; Schaffner, 2006; Poirier, 2006). In fact it is a trade-off; reductionistic explanations gain in simplicity while losing in accuracy. Ontological reductionism seems particularly problematic with reference to a complex phenomenon like religion, where overly simplistic explanations will yield models that are misleading, mistaken, or useless (Vergote, 1998, p. 42; Watts, 2002c, p. 25; Taylor, 2007, p. 679). Allport viewed ontological reductions that attempted to make religion nothing but a psychological state as arrogance (Vande Kemp, 2000). Holism rejects ontological reductionism because the whole is greater than its parts and thus cannot be reduced to it (Barbour, 1998). Furthermore, ontological reductionism is unnecessary as other kinds of simplification can be carried out without making ontological assumptions (Ruse, 2000, p. 270). Advocates (e.g., Sagan, 1997, p. 275) argue that reductionism is one of the greatest achievements of science even when it turns out to be wrong.

2.1.3 *Materialism*

Materialism in psychology refers to “the *sufficiency* of the material of the body (biology) alone for explaining our minds and behaviors” (Slife & Hopkins, 2005, p. 122). It is a metaphysical position related to **ontology**, the nature of things, and is thus a philosophical position rather than a scientific fact. It is often closely related to materialism as an ethical philosophy (cf. Section 11.1.2). It has a long history in philosophy dating back to the ancient Greeks, but it was not a widely held position prior to the 19th century. Some philosophers argue that materialism is the dominant ontology in philosophy and science today (Moser & Trout, 1995, p. ix) and is so widely accepted that people are often unaware that it is a metaphysical position that they hold. However, materialism is still controversial in philosophy, as it has great difficulty accounting for things like mental life and our subjective experience, which are seemingly nonmaterial in nature (Madell, 2003; Nagel, 1986; Griffin, 2000, pp. 76–77).

A common version of materialism is **reductive** or **eliminative materialism**, a kind of ontological reductionism that says everything is really just a collection of material particles and the laws that govern them. Reductive materialists typically exclude consideration of any potentially nonmaterialistic (e.g., spiritualistic) phenomena or more “subjective” methods that might accumulate data contrary to materialistic assumptions. All mental events must ultimately be reducible to material ones (Griffin, 2000, pp. 70–71; Nagel, 1970). For instance, the neurophilosopher Paul Churchland argues that things like “mind” or “spirit” are simply “folk psychology” terms that describe **epiphenomena**—things with no reality or ability to affect other things. He predicts that someday we will engage in some necessary linguistic reduction and replace concepts like “thought” with ideas from neurobiology that better recognize their material character. This position is not widely accepted, as others have pointed out that such a linguistic reduction has never succeeded in the history of science (D’Andrade, 1995, p. 165). Reductive materialism involves a kind of **dualistic reductionism**, where mind and brain are split from each other, and then the term that is inconsistent with the philosophical assumptions of the materialist investigator—the mind—is eliminated (Olafson, 2001, p. 72). It is generally anti-holistic as it holds that only the stuff things are made out of has real existence, not their organization (Barbour, 1998). In psychology, theories as divergent as behaviorism, Freudian psychoanalysis, and some variants of cognitive neuroscience are constructed on reductive materialist views of the world. Philosophers of science generally reject the use of these eliminative strategies (Wimsatt, 2006), but they are commonly used in psychology.

In softer varieties of materialism, material objects are thought to occupy a prominent but not exclusive role in the foundation of reality. Sometimes, this takes the form of a **methodological physicalism** which holds that nonmaterial things exist but that we can only study the world through physical entities (Shoemaker, 1999; Butchvarov, 1999). In milder positions like **supervenience materialism**, nonmaterial aspects of reality not only exist but also can be described; however, they do not exist independently of physical processes, because any difference in nonmaterial

states can only occur if there is a difference in physical states (cf. Murphy, 1998b). **Nonreductive materialism** is an even softer version of materialism, which argues that there are nonmaterial aspects to reality that at least initially owe their existence to material objects or processes but later function independently as emergent phenomena. These higher nonmaterial processes are able to exercise an influence on lower or physical levels of reality through top-down causation (Peacocke, 1993, p. 53). For instance, a nonreductive physicalist view of mind and brain holds that we are not just bodies, so that while mental events are embodied in brain activity they are not identical with it (Murphy, 1998a; Jeeves, 1998). Contemporary Christian theologians often hold softer versions of materialism, emphasizing the fact that we are embodied creatures and thus cannot be understood apart from our material nature but that reductive materialist positions cannot account for important aspects of the human person.

Materialism raises a number of philosophical and scientific problems. The definition of matter is problematic, as it is mass or energy—characteristics of matter, rather than matter itself—that appears in mathematical descriptions of the world produced by scientists. Quantum theory and other aspects of modern physics also deemphasize the importance of matter, as they suggest that the universe is more about structure and interaction than stuff (Stoeger, 2002; Heller, 1988). Reductive materialism also introduces problems into social scientific and psychological inquiries, since things of interest to psychologists such as cognition and emotion are often not material entities or open to direct observation (Slife, 2005).

2.1.4 Naturalism and Scientism

The word “natural” has a couple of different meanings in reference to science. In the first place, it can refer to an area of study, the natural world, which in the early modern period was taken to mean the nonhuman world of stars, rocks, plants, and animals. It also forms the root of the term **naturalism**, which is the philosophical position that the world around us can be understood abstractly in terms of natural, lawlike processes. In this abstractionist way of thinking, things are looked at from a universal viewpoint; what is important to know is not the things we see in all their diversity, but the uniform laws that presumably stand behind what we see. Sometimes, these laws are taken metaphysically as having a real existence rather than just descriptions of regularities (Stoeger, 1996; Davies, 1996; cf. Arendt, 1998, p. 268), as when we say that something falls “because of the law of gravity” or that “Mother Nature” (the sum total collection of laws) makes certain things happen. The presumed regularity of laws invites one to see the world—including the human person—in a mechanistic way. We become machines made of pieces that operate according to certain fixed principles so that an understanding of the parts gives complete knowledge of the system as a whole. The scientist is able to relate to the world as an outside observer of these abstract laws, rather than as a participant (Slife, Mitchell, & Whollery, 2004; Vergote, 1969, p. 51). For instance, the cognitive psychologist Pascal Boyer argues that religion is a natural outcome of the lawlike workings of cognitive mental processes and thus is entirely

predictable from psychological laws that can be derived by scientific observation (see Section 6.2.3).

Numbers (2003) distinguishes two varieties of naturalism: First is **methodological naturalism**, which is a commitment to produce lawlike explanations without recourse to supernatural forces. These explanations are abstractionist, and the methodology assumes that it is possible to understand a phenomenon from the position of an outside observer with objective neutrality (Drees, 1999, p. 26; Slife, 2005). This form of naturalism is widely accepted in psychology and in fact has been supported by Christians throughout the history of science. After 1750, a **metaphysical** or **reductive naturalism** also developed, which combines the tenants of methodological naturalism with epistemological reductionism (methods developed in the physical science are the best way to study everything) and reductive materialism (nothing exists except the material world; cf. Drees, 1999). The inclusion of these metaphysical beliefs makes naturalism into an ontology or view of the world rather than a methodological stance. It tends to blur the distinction between human and nonhuman (Olafson, 2001, pp. 5–6; Griffin, 2000, p. 37). The acceptance of metaphysical naturalism within psychology can be seen in a number of areas and can be found in the psychology of religion as early as the work of James Leuba (Murphy, 1928; see Section 1.4.2). The adoption of naturalism means that phenomena which fit most comfortably within a naturalistic frame will be privileged subjects of study, and methodologies best suited to the study of those objects will be held in highest esteem. Some scholars argue that it is possible to accept methodological naturalism while rejecting the limitations inherent in metaphysical naturalism. Others argue that both abstractionist and objectifying explanations are problematic, as even a milder methodological naturalism has metaphysical assumptions that bias investigations, particularly those related to religion (Slife & Whollery, 2006; Slife, 2005).

Many philosophers (e.g., Strawson, 1985, pp. 2, 67) have noted a connection between reductive forms of naturalism and **scientism** or “the attitude that the only kind of reliable knowledge is that provided by science, coupled with a conviction that all our personal and social problems are ‘soluble’ by enough science” (Peacocke, 1993, pp. 7–8; cf. Ruse, 2002) so that the domain of science has no boundary (e.g., Drees, 1999, p. 8). Along with scientism comes increasing cultural technification so that the superiority of science and technical solutions to problems is taken for granted or becomes commonsense and a never-discussed basis for thinking and practice. Extreme versions of scientism hold that science is the only truly valuable enterprise, thus limiting or eliminating the possibility of true dialogue with religion or for that matter with many other disciplines of human study such as the humanities (Polkinghorne, 2004, pp. 24, 179; Stenmark, 2001, p. 19). While some version of scientism is still a common belief among scientists, it has also been heavily challenged as a basic logical error or category mistake about what science is and can do (e.g., Peterson, 2003; Zahavi, 2004). Critics outside of science have pointed out that science has been unable to deliver on the grand promise of solving all our difficulties and has brought with it other problems. This has led to a lot of skepticism toward science in some quarters. As Kay and Francis remark, “scientism is not just bad for religion; scientism is bad for science itself, because it presents a false view of what science is and what science can properly be expected to achieve” (1996, p. 155). The

fact that scientism is not scientifically demonstrable also suggests a problem with its rational coherence as well (Shanahan, 2004, pp. 243 n. 14, 318).

Richard Gorsuch points out that a naturalist metaphysic sits uncomfortably with the study of religion in a couple of ways. First, while a naturalist view of the world focuses on law, in fact we live in a world of rich diversity that is not completely captured by these laws (2002a, p. 51). This is particularly true of the human and mental realms which have few if any determinative laws, so some would argue that naturalism may be problematic for psychology (Polkinghorne, 1988, p. 136). Science tends to value the generality of law over specificity of particular situations. However, if the aim of science is to gain a better understanding of the world around us, specificity can be just as important as broad laws, for very general laws cannot reliably tell us what is the right thing to do in specific situations (Shanahan, 2004, p. 90). In this view, nonnaturalistic approaches could and should supplement naturalistic ones in our attempts to gain knowledge. Second, a lawlike view of the world is hard to reconcile with the idea of a God who acts in history: “By definition, God’s individual acts do not replicate. So science can never identify them even if they happen a dozen times a day in every scientist’s life” (Gorsuch, 2002a, p. 66). For this and other reasons, some authors have questioned whether metaphysical naturalism can be reconciled with Christianity or any of the major world religions (Richards & Bergin, 2004; Griffin, 2000, pp. 35, 65). Others have pointed out that reductive naturalism has a tendency to lead to a broader moral and ethical skepticism that is based on an ideological philosophical position, not on facts (Hurlbut, 2002).

2.1.5 Assessment

We now have a basic philosophical vocabulary that will help us understand some of the issues in the dialogue between science and religion. The positions that we have reviewed are important, but unfortunately are often adopted by participants in the dialogue without reflection, justification or understanding of their implications. We will see that the uncritical adoption of strong reductionist and naturalist positions has greatly affected the dialogue between science and religion, particularly within the field of psychology. As the 20th century saw a strong philosophical and scientific critique of these reductive positions, different ways of thinking about science and religion emerged that offer new possibilities for dialogue.

2.2 Early Modern Views of Science and Religion

2.2.1 Background to the Modern Period

Science and religion have coexisted in Western civilization since classical Greek times. Contrary to popular perception, for most of that period the relationship involved peaceful coexistence and even cooperation. For instance, in the Middle Ages, studies of the natural world, human behavior, and theology were part of a

body of knowledge learned by all educated people. Relations between science and theology were generally harmonious, with science playing a subsidiary but increasingly independent role from theology as a separate but interrelated field. Theologians like Aquinas could write about the mutually beneficial interaction of science with theology as he worked to integrate Christian ideas with Aristotelian views of science and causation (Thomas, 1998, Pt. I, Q 79, Art 9; Aristotle, 1941, Bk. 2 Ch. 3, pp. 240–242). Applications of science to theology included reinterpretation of scriptural passages that were found to conflict with accepted scientific theory and observation (Grant, 1986). Problems in the relationship had to do more with professional rivalries rather than any perceived conflict between science and religion. In fact, many historians argue that medieval religion and later Puritanism actually played an important positive role in the development of modern science (e.g., Lindberg, 1992; Kocher, 1953; cf. Cohen, 1990). As late as the 16th and early 17th centuries, there was no firm dividing line between natural philosophy (science) and other branches of philosophical inquiry so that people worked in both areas and freely shared perspectives (Zagorin, 1998; Brooke, 1991, pp. 1–116). In the early modern period, however, a divorce began to develop between science and religion, particularly in the work of Francis Bacon.

2.2.2 Francis Bacon and the Beginnings of Modern Science

Francis Bacon (1561–1626) is often identified as producing the first systematic exposition of the modern scientific method, as well as the most important early modern statement about the relationship between science, metaphysics, and theology. As a result, his views set the tone for ideas about science and religion in the modern period. Bacon came to this topic not as a working scientist but as a man of learning who was interested in promoting the growth of knowledge and technology. He felt that science, like religion, should lead to “good works” (Zagorin, 1998).

While Bacon did not identify himself as a Puritan, he grew up in a Puritan home, and his work reflects Puritan and Calvinist Christian influence. His ideas were often seen as a natural part of Puritan eschatology and ethics (Perez-Ramos, 1988, p. 13). Puritans thought that the church would play a role in creating the Kingdom of God on earth through learning and progress. These ideas generated a positive and optimistic attitude toward the future and human works that is reflected in Bacon’s writings.

2.2.2.1 The Purpose of Science and Learning

Bacon had a very practical or utilitarian view of knowledge. He was concerned with the broad social role that science could play in human life, as well as the advancement of knowledge for its own sake (Rossi, 1997). He viewed the relationship between utility and knowledge as important in a couple of ways. First, he saw knowledge and science as a means to power that would help us subdue nature so

that we could gain resources and pursue human goals. For Bacon, knowledge and power were interchangeable concepts (Bacon, 2000). Second, the ability to make artifacts or achieve control over nature was a validation of knowledge, a way of verifying and demonstrating that our ideas about the world are accurate (Perez-Ramos, 1988, pp. 143–148). In this view, any kind of progress or increase in power is good, and in fact Bacon believed that advances in military technology were just as good as the invention of printing or ways to preserve food. He saw no need for science to have an ethic that would distinguish between various goals of progress, perhaps because he thought that morality was really the concern of religion rather than science (Bacon, 2001, pp. 32, 213; Perez-Ramos, 1997).

2.2.2.2 The Need for New Scientific Methods

In *The Advancement of Learning* (1605), and particularly in his later work, the *New Organon* (1620), Bacon articulated new ideas about scientific investigation. Prior to Bacon's work, scientific work was often guided by the method of Aristotle, who argued that explanations of the natural world should focus on the causes of phenomena. Aristotle believed that often things happened because of some end goal or purpose in nature, what he called **final causes** and that one could construct **teleological** explanations of the world based on an understanding of how things happen in order to reach certain ends or goals. Bacon thought that scientific explanations based on teleology were questionable. He believed that explanations based on final causes were really a human invention not derived from the nature of the universe, a position that seems defensible when examining inanimate phenomena but questionable in a full account of living things (Ayala, 1998a). Bacon believed that teleological explanations were uncertain because they were really part of metaphysics or philosophical speculation on the nature of the world. In his view, science should avoid teleology and primarily follow the interpretive method of induction, compiling large amounts of detailed information and then looking for generalities. He thought this **inductive method** was less prone to error, although he also acknowledged a role for the **deductive method**, where a scientist invents new experiments based on the generalities derived from inductive investigation. This “double ladder” of investigation involving inductive and deductive inquiry formed his complete view of science, which he envisioned as an undertaking of an organized community (2001, p. 95; Rossi, 1997, p. 32). He preferred inductive interpretation, because it involves gathering information from a broad range of sources, as opposed to deduction that is less open, looks at a limited range of familiar evidence and thus may produce little progress.

2.2.2.3 Science, Religion, and the Two Books

Early modern philosophers like Bacon and Thomas Hobbes (1662) struggled to define the relationship between science, religion and different fields of human inquiry. While Hobbes tended to subordinate religion to science, Bacon is well

known for advocating separation between science and theology, a position widely held by his scientific contemporaries (Zagorin, 1998, p. 49). He used the **two books analogy** from Augustine (1994) to justify this, arguing that theological knowledge is based on revelation from God's "book," while science or natural philosophy is based on evidence from the senses and nature's "book" (cf. Bacon, 2001, p. 89). They should be separate, for "to seek heaven and earth in the word of God is to seek temporary things amongst eternal; and as to seek divinity in philosophy is to seek the living amongst the dead, so to seek philosophy in divinity is to seek the dead amongst the living" (2001, p. 220). In particular, the miraculous cannot be conceived as part of the natural world and as such has no place in science (2001, p. 75).

Bacon was skeptical of **natural theology**, the attempt to use what we see in the world as a support for our understanding of God. In the Middle Ages, natural theology was a favorite topic, and aspects of the world were used as the basis for proofs about the nature and existence of God. Bacon had a different and more limited view of the possibilities of natural theology (Barnouw, 1981). He certainly agreed with theologians like John Calvin (1960, p. 52) that God could be seen in the world because creation contains the imprint of the Divine mind. Contemplation on the book of nature could thus lead a person to meditate on things like God's omnipotence and might help bring religion to atheists who will not accept supernatural proofs. However, Bacon believed that an examination of nature cannot really provide safe religious knowledge, as the use of philosophy or science to support religion makes it dependent upon changeable current opinion and ultimately is an expression of a lack of faith (Bacon, 2001, pp. 92–93), a position also held by his contemporary Galileo. Even more foolish are attempts to derive natural philosophy from the scriptures, as the Bible is not intended to be a scientific book (Bacon, 2000). Thus, Bacon had a position that was closed to the possibility of a theologically informed science as well as skeptical of natural theology.

While Bacon separated science and theology, he thought the study of the human person involved both books. He considered psychology under the head of human rather than natural philosophy, although he thought that because of the relations between mind and body, the study of the mind could not be strictly assigned to either and that ultimately knowledge of the human person was also a type of religious knowledge and thus the province of theology (Bacon, 2001, pp. 109–110).

2.2.2.4 Problems and Prospects

While many of the specifics of Bacon's proposals were ignored, his ideas about the broad social role of science, technology, and advancement had a wide and continuing influence on Western modernity (Perez-Ramos, 1997). Many of these effects persist today and have been criticized by contemporary authors.

Change from contemplation to power. Koyre (1965, pp. 6–11) indicates that a prime effect of Bacon and others at the time of the scientific revolution was the destruction of a worldview that included value, purpose, and the qualitative aspect of human experience. His views moved society away from classical utopian ideals

of contemplation, self-sufficiency and pursuit of the good rather than the conquest of Nature (Weinberger, 1985, p. 21). Dossey (1997) argues that Bacon's amoral approach has created problems for science. Many people associate science with an unbridled pursuit of power and that the technology developed as a result of this is responsible for many problems such as global environmental degradation. This leads people to oppose scientific study when it might be helpful.

Separation of fact and value. Bacon treated advancement as an end in itself that was separated from ethical or moral concerns, which were seen to be the province of theology. His thought introduces a distinction between *facts*, which he saw as related to science, and *values* that were the concern of theology. However, Bacon's scientific enterprise is in fact quite value laden. In his descriptions of science and the pursuit of knowledge, he privileges the values of progress, control, or manipulation of nature for human ends over contemplative religious values. In a sense, facts become more important than values.

Science and religion. While Bacon was an advocate of separating science and religion, he also provides some positive prospects for conversation or integration. Certainly his view of science was an open one that avoided reductionist positions and allowed for broad inquiry with little limitation of subject matter. While science and nature are separated from religion as a different "book," Bacon held that the book of revelation is also a valid and valuable way to knowledge. Both are viewed as necessary to an understanding of the human person.

2.2.3 Kant and the Problem of Empiricism and Skepticism

Other early modern philosophers also wrestled with the problem of scientific and religious knowledge. Bacon's positive view of experience and induction was challenged by the Scottish philosopher, David Hume (1711–1776), who argued that there was no way that definite knowledge could be based upon sense experience, because we can never prove that what we have experienced in the past will also be true in the future (Hume, 2001, pp. 61–65). This **problem of induction** threw into question the validity of Bacon's inductive empiricism as a methodology for scientific inquiry. Hume's skepticism led to a number of attempts to defend our ability to gain knowledge, including the important work of Immanuel Kant (1724–1804). Kant thought that there were three great questions of life: What can I know? What ought I to do? What may I hope? (1965, p. 635). The last question is primarily a religious one, but the other two are both psychological and theological in nature. His answers to those questions have had a great impact on the relationship between science and religion.

2.2.3.1 What can I know?

Kant believed there were three fundamental powers of the soul: (1) the *cognitive power* involved in our understanding of nature; (2) the *power of desire* which

governs our **practical reason** about moral matters and is based on freedom and the moral law; and (3) the *feeling of pleasure and displeasure* which forms the basis of **judgment** (Kant, 1987, p. 16). Our cognitive powers operate through **analytic reasoning** that breaks things up into parts and explores what we already know and **synthetic reasoning** that adds to an original concept and give us two kinds of new knowledge: *a posteriori* knowledge dependent on experience and *a priori* knowledge that is necessary and universally true completely independent of experience. He referred to reasoning based on a priori knowledge as **pure reason** (1965, pp. 41–62).

Kant believed that our knowledge of the world was limited. He divided the world into two realms, the **phenomenal** world of objects as we experience them with our senses, and the **supersensible** world where the real things-in-themselves or **noumena** exist (1965, pp. 257–275). Kant thought we could never know real supersensible reality directly or in full but that we could have intuitions of it through sense experience (1965, p. 105). Thus Kant had a **subjective** understanding of knowledge as created within the person, connected to reality without fully grasping it. He believed that this creative process was dependent upon basic *a priori* mental categories like time and space that help us interpret our experience. His position acknowledged that human reason has its limits but that things have a real existence and that we can know some things about them. For instance, Kant believed that God and human freedom are supersensible and as such cannot be known directly or be an object of scientific inquiry. However, through pure reason, we can infer their existence and some fundamental things about them (1965, pp. 297–300, 322–326; 2002, pp. 119–121). Importantly, Kant thought that *relationship* was a fundamental mental category for organizing experience; his idea marked the beginning of a trend toward seeing relationality as central to an understanding of the human person (Shults, 2003, pp. 20–21).

2.2.3.2 What Ought I to do?

Kant believed in the existence of a universal supersensible moral law that cannot be deduced from experience (1960, p. 15) but that all people are aware of *a priori*. Because of this awareness, it can be an object of pure reason and guide our practical reason (2002, pp. 43, 161). Pure reason allows us to derive the existence of freedom from the presence of the inner moral law we possess, since freedom is a necessary prerequisite to carrying out the law (1965, pp. 635–636; 2002, pp. 4, 29). However, since God and the moral law cannot be deduced directly from experience, they cannot be the object of scientific inquiry and must be kept separate (1960, p. 15). We can also reason that growth in virtue requires more than the time available in a finite human existence, suggesting the necessity for the immortality of the soul. Furthermore, a Supreme Reason (God) must be postulated to ensure that the highest good of moral law and happiness can be achieved together (2002, pp. 122–129; 1987, p. 450). If reason were the complete determinant of our behavior, then we would unfaithfully use our freedom to follow the moral law, but since that is not the case,

we experience the law as a moral or “categorical imperative” of things we should do. Our relationship to the moral law should be one of dependence, duty, and obedience out of “moral feeling and respect for the law” (2002, pp. 20–21, 32–33, 75–82). Ultimately, he believed that following the moral law meant treating others as “ends in themselves” and not as “means to an end.” This treatment of moral law as a matter of practical reason paralleled Bacon’s separation of fact and value and cemented it in a comprehensive and influential philosophy (Barbour, 1997, p. 47).

In his later work, the *Critique of Judgment*, Kant argued that not only are God, freedom, and immortality necessary for fulfillment of the moral law, but a belief in the purposiveness of nature is also necessary and forms the basis of the faculty of judgment, although it cannot be a matter of scientific proof (1987, pp. 196–198, 435–436). Thus, Kant was uncomfortable with Bacon’s removal of final purpose or **teleology** from any connection to our view of the natural world.

Kant thought that true religion is a moral religion founded on rationality, a “pure religion of reason” (1960, p. 140) with theology based entirely upon the moral law. It is morality, rather than the natural world, that leads us to religion and a view of God as Lawgiver. God is ultimately unknowable and engaging in acts of worship or devotion that attempt to bridge this gap is rationally indefensible and constitutes superstition or fanaticism (1960, pp. 5–6, 162). Kant viewed this compartmentalization of self, natural world, and God as a way of protecting religion and keeping science or rationality within appropriate bounds. However, his system also served to isolate religion from science and philosophy, increasing the divide between them. His orientation to religion was also very individualistic, a trend that will reappear in the work of William James (e.g., Kant, 1987, p. 273; Taylor, 2002, p. 14; see Section 4.2).

2.3 The Rise of Classical Positivism

Kant was a philosopher of the **Enlightenment**, the 18th century intellectual movement that hoped to make a society based on human reason. Some Enlightenment philosophers like Kant were concerned to maintain a role for religion in a rational society. In contrast, French Enlightenment thought put forward views that favored science and opposed theological or religious ideas. These currents converged in the philosophy of **positivism** developed by Auguste Comte (1798–1857), who created the first comprehensive philosophy of science since the time of Bacon. In this philosophy, Comte argued that human society and inquiry should be based only on positive, verified knowledge obtained through science. Positivism marked a shift to hard versions of naturalism, materialism, and scientism that went beyond separation and advocated the overthrow of theology. It included (1) a Baconian emphasis on science as a tool for power and control, (2) a reductionist view of inquiry, (3) a reductionist view of the unity of science, and (4) a view of history that emphasized scientific progress.

2.3.1 *Basic Tenants of Classical Positivism*

In addition to adopting Bacon's attitude of science as a means to power, Comte's positivist philosophy advocated a *strong empiricist and naturalist view of inquiry*. He believed that the only true knowledge is scientific or positive knowledge based on observed facts. He also argued against trying to understand the true cause of things, which he considered to be metaphysical speculation: "Instead of resorting to the old ways of pronouncing or imagining *why* it must be so, the positive philosophy instructs us to recognize the simple fact that it *is* so" (Comte, 1998a, p. 122). The most that we can do is observe "relations of succession and likeness" which he hoped would eventually lead to the discovery of invariant natural laws, which would make possible our prediction and control of the physical world and also perhaps the social world (1998a, pp. 160, 241–243; Ple, 2000). Thus, Comte adopted the Kantian skepticism about knowing the real nature of things, although for somewhat different reasons.

Comte also had a *strong reductionist view of the unity of science*. He constructed a hierarchical model of the interrelationship of scientific disciplines. Higher sciences on the list were "closely dependent" on those lower on the list, while more basic ones were wholly independent of higher ones (1998a, p. 144). The hierarchy was

- Social physics (Sociology)
- Biology and Physiology
- Chemistry
- Physics
- Astronomy
- Mathematics

Psychology was not included in the list, because he considered the mind to be a biological development and its study a branch of physiology. He viewed all psychological and social phenomena as ultimately governed by material, biological laws (1998a, pp. 255–257). He believed that as much as possible we should aim to explain things using the fewest possible concepts and that the use of scientific methodology should be extended to the study of individuals and groups. However, he also acknowledged that each field of study must modify this basic method to suit its object of study (1998a, p. 112).

In the narrative portion of his theory, Comte formulated what he called the *Law of Three Stages* of human history, arguing that it was inevitable that humanity would progress through three phases: "the primitive theological state, the transient metaphysical, and the final positive state" (1998a, p. 285). In the final stage, science would assist in the elimination of theological and metaphysical (philosophical) ideas and help found a new and more orderly society that would replace absolute ideas with the doctrine of relativism (1998a, pp. 212, 220). Comte argued in a seemingly paradoxical manner that the only force that could ensure this transition to a utopia was a religious or spiritual force. So despite his own personal atheism, Comte rejected atheism as a philosophical position (Pickering, 1993, p. 654). He proposed

to construct a “Religion of Humanity” (1998b, p. 381) with humanity constituting the “Great Being” (1998b, p. 445). Included in the religion were a system of social worship, a positivist calendar and pantheon of saints, and a positivist library of 150 books (1998b, pp. 454–480) with others subject to destruction. The “ascendancy of Humanity” would substitute for “the utter exhaustion of the Kingdom of God” (1998b, p. 483).

2.3.2 *Implications and Assessment*

Comte’s theory is very significant in several ways, although many of his ideas like the Religion of Humanity met with a lukewarm reception from his contemporaries. It articulated an influential philosophy of science that moved from milder versions of reductionism, materialism, and naturalism as found in Bacon to more reductive ones. It also moved the relationship between science and religion from a “two-books” doctrine to a stance of conflict. This attitude became increasingly common as the 19th century progressed and can be seen in books like Andrew White’s *History of the Warfare of Science with Theology in Christendom* (1901), as well as the later work of authors like Bertrand Russell. Positivism became one of the major factors in ideological secularization (Marsden & Longfield, 1992, pp. 16–25; Senne, 2002).

One especially influential aspect of Comtean positivism is his view of history as inherently progressing toward a scientific ideal while primitive beliefs like religion are destined to disappear. Although this “subtraction narrative” view of history has been discredited by modern historiography (e.g., Leahey, 2002), it was and is quite influential within the field of psychology (Simon, 1963, p. 24; O’Connor, 2001; Leahey, 1987, 2002; Nelson, 2006). It is also central to humanist and secular self-understandings and views of religion (Taylor, 2007). In the general culture, it can be seen in the common assumptions that traditional practices are outmoded, and future progress will provide better solutions—a conclusion not always warranted by the data. It also remains an assumption among many in the scientific community. It can be seen in scientific statements and narratives that convey the impression that we have certain knowledge about something even though research findings do not support definite conclusions (Young, 2004a). Even more common is the habit of admitting flaws in a theory or data but then minimizing them by saying that they will be cleared up in the future (Arendt, 1968, p. 346). Writers like neurophilosopher Paul Churchland or the sociobiologist E. O. Wilson also put forward this kind of 19th-century viewpoint, when they argue that through science we are moving away from a “folk psychology” referring to the mind (Churchland, 1995, p. 155) and “primitive religious beliefs” to a new scientific vision of the world that is freer and more morally insightful (Churchland, 1996, pp. 17–18; Wilson, 1978, pp. 192–193, 200–201). This puts some neurobiologists who wish to move away from acknowledging the existence of the mind in the odd position of denying the reality of the phenomena they are studying, which seems at odds with scientific empiricism (Zahavi, 2004).

2.4 Logical and Neo-Positivism

At the beginning of the 20th century, attempts at reformulating the positivist system led to the development of **logical positivism**, a version of positivism incorporating analytic philosophy of language and logic. By the end of the 19th century, it became a goal of philosophers like Bertrand Russell (1872–1970) to analyze and reform language, purifying it of religious and philosophical content so that it could be a vehicle for logical analysis and statements of empirical, scientific knowledge. Russell's work combined logical analysis with both the empiricist and sociohistorical agendas advocated by Comte. Influenced especially by Russell's thought, and by their interpretations of the early work of Ludwig Wittgenstein in the *Tractatus Logico-Philosophicus* (1975), positivists picked up these trends in logic and language, combining them with positivist philosophy to form logical positivism.

Logical positivism flourished during the early part of the 20th century, thanks in part to the work of the Vienna Circle, a group of scientists and philosophers that met periodically to discuss various topics. Their initial goal was to propagate a scientific worldview, developing a unified science, and a definition of scientifically testable statements purged of metaphysical or theological ideas. Most of this group subscribed to a set of basic tenants relating to verification of truth and the nature of science, in addition to the basic concepts articulated by Comte.

2.4.1 Basic Tenants of Logical Positivism

2.4.1.1 Verification

Logical positivists believed that the truth of propositions could and should be verified by reference to simple empirical facts. In the original logical positivist formulation, verification was done empirically, by comparing “atomic” scientific statements with data (Wittgenstein, 1975; Russell, 1966). In this view, truth takes the form of representational propositions about the world, and the observer plays only a detached, mechanical role in the verification of truth claims. Initially, the group set up very strict criteria for verification. However, as time went on, the idea of atomic verification was discovered to be unworkable, and more relaxed criteria were proposed (Ayer, 1966; Feigl, 1956; Schlick, 1949b). Carnap (1949b) later retreated from the idea of truth value altogether, saying that scientific statements can never be definitely accepted or rejected, but they can only be confirmed to a greater or lesser degree by observation or comparison with previously accepted statements.

The logical positivist stance on verification carried with it three important corollaries. First, only certain kinds of statements were in fact verifiable, and statements not verifiable were considered nonsensical. Significantly, since metaphysical or theological propositions were not completely verifiable according to logical positivist standards, they were considered nonsensical and fit for elimination from discussion. For example, logical positivists would say that statements about life after

death are neither true nor false, they are simply nonsensical. Scientific explanations were seen as superior to theological or metaphysical ones because of their testability and parsimony (Feigl, 1949a,b; Ayer, 1952, 1966; Ayer & Copleston, 1994) and their ability to make use of quantitative and experimental methods (Carnap, 1995). Most statements about ethics and values were considered to be metaphysical statements or simply expressions of feeling, so this area was of relatively little interest to them (Ayer, 1966). Logical positivists of course denied that they had any kind of metaphysical or religious presuppositions underlying their work (Feigl, 1956), a position that was challenged by their critics. They claimed that the scientific method of studying data and reaching conclusions generated “positive” knowledge, which seems contradictory to their tacit acceptance of Hume’s skepticism.

Second, logical positivists thought that verifiable statements needed to be composed of precisely defined terms. They supported the development of **operational definitions** that put concepts in terms that would allow their inclusion in scientific studies that could evaluate their meaningfulness and fruitfulness (Frank, 1977; Feigl, 1949a). Statements were expected to be definite, logically consistent, and aimed at increasing predictiveness. Feigl (1949a) argued that one of the main reasons for the use of operational definitions was to purify science of any pre-scientific or nonscientific (e.g., metaphysical) elements, along with its practical purpose in clarifying meaning. Many authors (e.g., Schlick, 1949b) drew on the work of Percy Bridgman (1993), whose theory of operationalization stressed the importance of repeatability in scientific study. This latter point is quite important with regards to integration, because some (but not all) elements of religious truth (e.g., revelation) are inherently non-replicable and thus by this definition not scientific statements (Gorsuch, 2002b).

Finally, logical positivist standards of verification led to a reductive materialist position. Minds, feelings, and other internal phenomena could be said to exist as long as it was agreed that they were simply “abbreviations of physicalist statements” (Hempel, 1949). Schlick (1949c) claimed that this was empirically true and did not constitute a metaphysical presupposition, partly because he argued that quantification and agreement between observers was necessary to science and that only physical things could be measured quantitatively or allow for observer agreement.

2.4.1.2 Synthetic and Analytic Truth

Kant had argued that it was possible to learn new things through analytic logic or synthetic *a priori* reasoning from self-evident truths apart from experience. Logical positivists agreed with Kant’s classification of reasoning but rejected his position that *a priori* principles could have a role in synthetic reasoning (Schlick, 1949a; Wittgenstein, 1975, p. 71). Thus, *new (synthetic) knowledge could only be gained through experience*, which they defined as verifiable sensory experience. Language could be analyzed to see if a particular statement or process of reasoning was analytic or synthetic *a posteriori* (from experience), and any statements that

were neither were nonsensical. Furthermore, synthetic *a posteriori* reasoning was believed to be entirely objective and independent of any theory or factors related to the observer.

2.4.1.3 Reductionism and the Unity of Science

Logical positivists believed that science provided a unified approach to knowledge. Part of this had to do with the broad view of science held by writers like Carnap, who defined science as “all theoretical knowledge, no matter whether in the field of natural sciences or in the field of the social sciences and the so-called humanities, and no matter whether it is knowledge found by the application of special scientific procedures, or knowledge based on common sense in everyday life” (Carnap, 1949a). They also generally accepted the Comtean idea of a hierarchy of sciences with physics at its base, and chemistry, biology, psychology, and the social sciences on successively higher levels and used what they called *theoretical reductionism* to express one theory (e.g., a psychological theory of mind) using the concepts of another theory (e.g., a biological theory of brain). Hempel for instance argued that there was no inherent difference between psychology and the natural sciences. Psychology could be considered “an integral part of physics” (Hempel, 1949) and that eventually it could be derived from biology (Carnap, 1949a). They thus endorsed the ideas of logical and causal reductionism (see Section 2.1.2).

2.4.1.4 Logical Positivism and Religion

Like classical positivism, logical positivism typically had a negative attitude toward religion. For instance, Feigl (1980) argued that anything based on metaphysical or theological presuppositions was incompatible with modern science. Things like “magic, animism, mythology, theology and metaphysics” were all remnants of or regressions to prescientific thought characteristic of “less mature phases of intellectual growth.” Nonscientific ways of knowing like “religious ecstasy” or artistic inspiration were not valid knowledge claims, although he did approve of religious devotion to values. As a consequence, positivists such as Russell and Ayer led a sustained, determined attack on religion (especially Christianity) and theological beliefs. In *Religion and Science* (1997), Russell wrote a paean of triumphal scientism, exposing how the steady progress of science had unmasked the flaws of religion and various nonsensical religious ideas such as free will. Interestingly, some of the triumphal character of his 1935 work disappears in his book *The Scientific Outlook* (2001), where he gives this description of a scientific society:

In such a world, though there may be pleasure, there will be no joy. The result will be a type [of people] displaying the usual characteristics of vigorous ascetics. They will be harsh and unbending, tending towards cruelty in their ideals and their readiness to consider that the infliction of pain is necessary for the public good. . . . The man drunk with power is destitute of wisdom, and so long as he rules the world, the world will be a place devoid of beauty and of joy (2001, pp. 212–213).

2.4.2 *The Destruction of Positivism*

By the mid-20th century, positivism was largely dead as a philosophy of science and prominent psychologists like Sigmund Koch were criticizing its presence in psychology (Passmore, 1967; Day, 1998). The destruction of logical positivism happened as a result of two devastating critiques. The first challenge came from philosophers of science like Karl Popper (2002), who disputed some of the key tenants of positivism. Much of this critique came from writers like Ludwig Wittgenstein and W.V.O. Quine, who at one time had connections with logical positivism. The second line of attack came from new studies showing that science actually works quite differently than the picture painted by positivism.

2.4.2.1 *The Conceptual Critique*

Collapse of positivist verification. A number of compelling arguments by scientists and philosophers caused the logical positivists themselves, as well as others, to abandon the idea of verification:

- a. Several authors demonstrated that hypotheses could not be conclusively verified or proved *true* through simple observation and induction because there might be a counterexample. Under some circumstances, hypotheses can be tested and proven *false*, a principle that forms the basis of most research in the psychology of religion (Batson, 1997). However, even this kind of testing is difficult or impossible to do in complex situations (Popper, 2002), and some authors have pointed out that hypotheses are not verified or rejected on the basis of individual facts. Instead, theories are accepted or rejected as an interconnected whole after a weighing of all the evidence (cf. Quine & Ullian, 1978). Thus, contemporary philosophers of science have abandoned the view that science is about verifying propositions.
- b. Verification statements are not just impartial representations of a bit of reality, because most language involves not *seeing* but *doing* things in a particular context. Language is a game with certain rules agreed upon by people in practical situations. Thus, any representation is not a universal law (a prime tenant of positivism) but simply true relative to the specific group and task at hand (cf. Wittgenstein, 1958).

Problems with reductionism. While many critics of logical positivism were sympathetic with a reductionist agenda, problems appeared with various aspects of their reductive strategies. For instance, the philosopher of science Carl Hempel demonstrated that no reductionist scheme and its associated theory are really verifiable, because there are numerous competing alternatives that may also be true (cf. Hempel, 2001a,b). An even more serious problem was the issue of **operational definitions**, the procedure by which various theoretical constructs of interest to psychologists (e.g., depression) are reduced to specific behavioral outcomes that can be measured (e.g., answers to questions on a survey). Positivists based their measurement ideas on the work of physicist Percy Bridgman, who developed the concept

of operational definitions in physics (1993). However, Bridgman was critical of much of the positivist agenda and objected strenuously to the applications of his ideas in psychology. He felt that the situational context within which behavior occurs could not be reduced to pure operational definitions. He also felt that the standards for operationalization and verification of facts used in physics were different from those appropriate for psychology and sociology (1959, pp. 21, 51; cf. Lash, 1996, p. 103). For instance, repeatability is a necessity in scientific verification within physics, but introspection—a valuable technique in psychology—is often inherently unrepeatable (1959, p. 239). Overall, Bridgman thought that a distorted and rigid use of his principle of operationalism would render the results of psychological investigation irrelevant (Bridgman, 1950, p. 4; 1959, pp. 56–61; Taylor, 1998). Since that time, the idea that we can strictly and completely operationalize a concept has been rejected in most quarters outside of psychology (Bickhard, 2001).

2.4.2.2 The Historicist Critique of Neopositivism

Although original formulations of logical positivist thought ceased to be viable after the 1930s, **neopositivist** theorists such as Carl Hempel (2001a,b) attempted to continue aspects of the theory while dropping unrealistic claims about verification. However, neopositivism outside of psychology did not survive a second challenge from a group that questioned the fundamental approach of the positivists toward the philosophy of science. This group argued that the positivists were wrong, because their description of science as an exercise in logical verification did not accurately describe what scientists actually did in their work. This descriptive or **historicist** approach was carried on by several people, notably Thomas Kuhn (1922–1996), Michael Polanyi (1891–1976), and Paul Feyerabend (1924–1994). They moved progressively from Popper's view that science comprises competing individual theories to Kuhn's view of successive paradigms to the view of Imre Lakatos of competing research programs (Lakatos, 1978, p. 132).

Kuhn (1996) argued that science operates within **paradigms**, which are ideas about how the world works and how we can best study it. He thought that there are two modes of scientific practice: (1) *normal science* which makes slow steady progress within a given paradigm but resists attempts to modify the paradigm and tries to explain away conflicting data; and (2) *scientific revolutions* which involve paradigm shifts. Kuhn's analysis of the history of science showed that science progresses by stops and starts and is as much a social enterprise as a logical one. This was quite contrary to positivist claims that because of empiricism and logical method the scientific enterprise was totally objective and unbiased and that the personal beliefs of scientists played no part in their work.

Other scholars came to conclusions that paralleled that of Kuhn. For instance, in the book *Personal Knowledge* (1962), the British chemist Michael Polanyi argued that scientific statements cannot be completely objectively justified so that when scientists state beliefs it involves a personal commitment to a particular position—a commitment based on evidence but still a personal commitment with subjective

elements. Paul Feyerabend (1993) argued that this was not bad because many of the illogical aspects of the process were necessary for scientific progress. The idea that scientists interpret their findings and results from within a paradigm suggests that science has an interpretive or hermeneutic aspect to it that is similar to other methods of gaining knowledge (Happel, 1996; see Sections 1.6.2, 6.3.2).

The actual science critique was formalized by philosopher Imre Lakatos (1922–1974), who proposed a new philosophy of science based in part on the historicist viewpoint. Lakatos critiqued the work of Popper, Kuhn, and others and came up with a theory that showed how scientific *research programs* were in fact structured and tested. In some ways, the research program theory attempted to combine the best elements of Popper and Kuhn. Lakatos liked Popper’s refutation of verification, but denied that it was possible to falsify a theory, since in actuality theories are never rejected on the basis of a little contradictory evidence. He liked Kuhn’s historical approach but denied the existence of a clean picture of normal science—revolution—new paradigm. Instead, Lakatos argued that research takes place in programs, which have a *hard core* of metaphysical ideas, as well as scientific beliefs and practices, that must be defended. However, over time, research inside and outside the program will accumulate evidence that does not fit with the hard core. When this becomes apparent, *auxiliary hypotheses* are then developed to explain these phenomena and protect the hard core beliefs. For instance, in evolutionary theory, the idea that we act to survive is a hard core belief, which is challenged by the fact that many people behave in altruistic ways that do not advance our survival or interests. Recognizing this, evolutionary theorists have developed an active research area to develop auxiliary hypotheses to protect the evolutionary hard core against this seemingly contradictory data. According to Lakatos, over time, the auxiliary hypotheses multiply and people increasingly spend their time defending the core beliefs rather than generating new knowledge, leading to a *degenerative* trend in the research program and its eventual abandonment in favor of another that offers more productive possibilities. In this view, science is often in a position where congruence with the reigning paradigm and protection of core hypotheses can take precedence over investigation and fit with actual empirical data.

2.4.3 Positivism’s Persistence in Psychology and its Effects

Psychology as a discipline separated from philosophy or theology during the last half of the 19th century and early years of the 20th century. As the founders of modern psychology sought to create a science of the mind, and later a science of behavior, they looked to positivist and logical positivist ideas about science that were accepted at the time in the physical sciences and philosophy. Although positivism has since been discredited as a philosophy of science, most observers agree that it remains the core philosophy for most of psychology (Koch, 1992), an “unspoken grammar” (Stam, 1992, p. 18) that has a number

of important behind-the-scenes effects and constitutes a kind of **neopositivism** within psychology. Characteristics of psychological neopositivism would include the following:

1. *Unreflective adoption of philosophical positions.* Positivists discouraged philosophical speculation and believed that their approach to science contained no assumptions (a view we have seen to be false). Given this kind of double blindness, it is not surprising that psychological theories and methods have unspoken positivist assumptions built into them such as (1) an observer can work completely independently of any presuppositions (a view shown impossible by many philosophers of science) and (2) psychological processes are ultimately explainable in terms of lower level processes in physics, chemistry, and biology. Positivism also introduces unspoken ontological assumptions like reductive materialism and naturalism (Yanchar & Hill, 2003; Griffin, 2000; Viney & King, 1998).

2. *Physics envy and the limitation of method.* Positivism argued a unity of science position that applied methods from physics to psychology independent of subject matter. This has discouraged qualitative research approaches that are often well suited to the study of religion or spirituality and discouraged conversations with investigators in disciplines using non-positivist methodologies.

3. *Narrowing of topics.* Psychological methodology was developed for use in a positivist framework, which assumes an eliminative materialism and strict rules of operationalism. This means that topics or questions of study that did not fit well in the positivist methods or worldview (e.g., things that implied the existence of non-objective phenomenon like consciousness) were largely excluded from study (Gadamer, 1981, p. 11). This has limited psychology to a 19th- or early 20th-century view of scientific practice in many areas (Taylor, 1998).

4. *Narrowing of theoretical approaches.* The paradigms in psychology with the widest acceptance have been those with positivistic and mechanistic orientations, such as behaviorism or computational models of the mind. This is not to say that there are not competing viewpoints (Yanchar & Hill, 2003) but simply that they are just that—competing voices that critique mainstream positivist views from the margins.

5. *Distorted perspective on current and new theories.* Positivism argues for a progressive view of history that discounts old ideas and automatically assumes that new scientific ideas are better (Leahey, 1987, 2002), potentially overvaluing new knowledge in relationship to old. Some theorists also take this view of progress to mean that problems with current theories will necessarily be eliminated by future progress, although there are no specific reasons to believe that this is true.

6. *Negative attitude toward religion.* Any of these five problems have the potential to affect the psychology and religion dialogue in a negative way by limiting topics, methods, and approaches. When we add to this the very hostile stance toward religion taken in positivist philosophy, psychology and religion dialogue would appear to be in serious trouble. However, the rejection of positivism opens new possibilities, and its demonstrated weakness is probably partly responsible for the revival in dialogue during the latter half of the 20th century.

2.5 Contemporary Issues in Science and Religion

The contemporary dialogue between science and religion outside of psychology is rich and vast. Much of this conversation has involved scientists—especially physicists—with broad training in theology or philosophy, as well as theologians and philosophers with scientific interests. Generally these thinkers reject the idea that science and religion are necessarily opposed to each other, a view similar to that held by medieval theologians (Taylor, 2007, p. 332; McGinn, 2001, p. 22). Most of the dialogue has taken place using a framework of Christian ideas about the world, although interesting parallels have been drawn between developments in modern physics and certain Hindu and Buddhist beliefs. Here, we will indicate some of the main themes of that dialogue so that we can better situate the interaction between psychology and religion.

2.5.1 *Developments in 20th Century Physics and Cosmology*

The new dialogue between science and religion is based on a number of scientific findings that challenge old positivist beliefs about the nature of the world. Four of these developments are of particular interest.

1. *Challenges to determinism.* Much of the problem in the relation between science and religion has resulted from models of the world developed in 18th and 19th century physics. These models were built upon a viewpoint of **strict determinism**, that is, they assumed that present and future events are completely controlled by events in the past. This of course makes it difficult to understand how free will can exist or how a God could be active in the world. However, *quantum theory* as developed by Niels Bohr and others suggests that at the subatomic level strict determinism does not hold, for instance, that the position of small particles cannot be completely predicted by past events, only the probability that the particle will be at a particular location (Peacocke, 1993, p. 47). This suggests that the universe is not mechanistic and has characteristics of both necessity and freedom, leaving the universe open to chance and creativity (Ward, 1996). Furthermore, quantum theory strongly suggests that particles do not attain a specific location until they are observed. This observational requirement has led to the controversial idea that consciousness—the ability to observe—must be a fundamental property of the universe (Davies, 1996).

Research on complex open dynamic systems such as living organisms shows that they operate in ways that violate traditional laws of determinism and entropy. This principle is developed in *chaos theory* (e.g., Crutchfield, Farmer, Packer, & Shaw, 1995). Complex systems fail to be predictable in several ways. First, small changes in initial conditions of the system can have unpredictably large effects, leading to what is called the *butterfly effect*, where a tiny action such as a butterfly landing on a leaf can change weather patterns in other parts of the world (Barbour, 1997, pp. 182–184). Second, while it is possible to specify how individual items of the system are related to each other, it is inherently impossible to predict the long-term behavior of the system as a whole even if all the relevant variables are known

(Wildman & Russell, 1995), as in the case of weather. Finally, complex dynamic systems exert effects of the whole on their components that are not strictly predictable from the sum of the parts (Peacocke, 1995). These properties make the system appear to be self-organizing and dependent on an interaction of chance or freedom and law or constraint that leads to properties of wholeness and emergence (Barbour, 1997, p. 193).

2. *Challenges to classical ideas of rationality.* Some phenomena behave in paradoxical ways. For instance, light appears to behave as both a particle and a wave. This is known as the principle of **complementarity**. It is a violation of classical Aristotelian logic, and at the quantum level various other violations also occur, suggesting that the nature of rationality in the universe can vary from that typically supposed in positivist science (Grib, 1996; Barbour, 1997, p. 167).

3. *Challenges to classical ideas of causation.* Standard materialist views of causation have held that causation happens when material particles interact and that causation ceases when there is no longer a material connection. However, quantum researchers have observed that once particles have interacted with each other, the behavior of the particles when observed remains linked even though the effects occur simultaneously and at a distance with no apparent material connection. This is sometimes known as the principle of **quantum entanglement** and is described by Bell's theorem (Tracy, 1995). Taken together, these three findings of quantum theory have made consciousness a more legitimate subject for research (Deikman, 2000, p. 75).

4. *Challenges to classical ideas about the universe.* Traditionally scientists have taken for granted the fact that the universe allows for the presence of life and that living creatures like humans can understand it. Contemporary writers find both of these facts to be remarkable; for instance, Einstein once remarked that the "most incomprehensible thing about the universe is that it is comprehensible" (quoted in Davies, 1996, p. 149). Modern cosmology suggests that the specific pattern of fundamental properties of our universe is extremely unlikely to occur by chance but is just right to allow for the presence of life, including intelligent beings. This is sometimes known as the **anthropic principle** (Barrow, Tipler, & Wheeler, 1988). This "fine tuning" of fundamental properties enhances the idea that the universe is an interconnected whole and relational (Ward, 1996; Barbour, 1997, p. 205). The fact that the universe not only exists but is also intelligible by us has been a point of dialogue for science and religion (e.g., Davies, 1993). Science presupposes and describes intelligibility, but cannot explain why it is so, an issue perhaps better treated by religious writers (Heller, 1995).

So far, there has been little or no attempt to revise psychological theory or methods in light of these developments, even though some of them pose challenges for current approaches within psychology. For instance, most psychological statistical procedures are designed to describe linear systems, where various elements are independent of each other, and the action of the whole is simply a combination of the individual actions of the parts. However, developments from modern physics, as well as anomalies found in behavioral research, suggest that many of the systems psychology attempts to describe are nonlinear in nature.

2.5.2 *Understanding Divine Action*

Authors in the science and religion dialogue have developed a number of ways to understand how God could exercise continuing activity in the world without violating modern understandings of the universe and its lawlike regularities. Robert John Russell (Russell, 1998; cf. Murphy, 1995) sees this happening at the level of quantum indeterminacy, which might in turn allow for God to act through the process of genetic mutations. John Polkinghorne (e.g., Polkinghorne, 1995) sees God acting by manipulation of chaotic system boundary conditions and the input of information. Arthur Peacocke looks at the effects of top-down or whole-part constraint, emphasizing that it is the interplay of chance and law that allows new forms to be created, to emerge, and to evolve (Peacocke, 1998, 1995, 2002). Some of these writers have used the **process philosophy** of Alfred North Whitehead (1861–1947) as a basis for their theoretical constructions. This philosophy emphasizes the changing nature of the universe and the interconnection of events, as well as the evolving nature of reality (Barbour, 1997, pp. 104, 285; Barbour, 2002; Griffin, 2000, pp. 82–106) (Fig. 2.2).

Other authors take a more **deistic** view, arguing that while God may have been involved at the time of creation, the Divine no longer acts directly in the world. An example of this would be the work of Paul Davies, who sees God's activity as the determination of natural possibilities at the time of the Big Bang, and that the complexity of current events is just a working out of these possibilities (Wildman, 1998; Davies, 1998; Barbour, 1998; Chela-Flores, 1998). In psychology, some authors

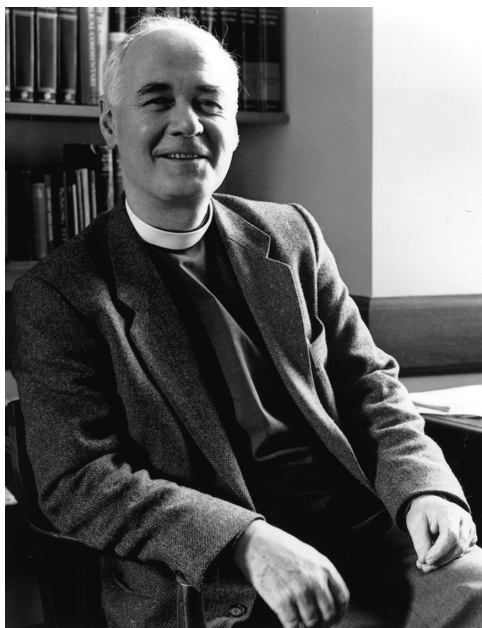


Fig. 2.2 *John Polkinghorne.* A physicist and an Anglican clergyman, he has written numerous books on science and religion issues from a critical realist perspective. Photo courtesy of Yale University Press

like Daniel Helminiak (1996) have also taken a deistic position, arguing that God as transcendent creator has little to do with human issues, and so thinking about God adds nothing to our understanding of psychology. The approach of Davies and Helminiak is less popular, because many authors want to find a way to understand the concept of agency and how God might be actively involved in the world on an ongoing basis (Polkinghorne, 1995).

The emphasis on constructing models of God's action that are in harmony with modern science has meant that many scholars have tried to avoid theories that use supernatural types of explanation. In **supernaturalism**, God acts by suspending natural law, while contemporary theorists try to picture a way that God acts in the world while respecting laws that are presumably of divine origin (Russell, 1998). This does not mean the rejection of transcendence or a supernatural agent, just a willingness to see God at work within the structures of creation, a position long held by Catholic theologians such as Thomas Aquinas (1998; Peacocke, 1998; Happel, 1995). These authors also try to avoid **God-of-the-gaps** explanations, where God is presumed to be active only in places that science cannot explain. Instead, they try to picture God as active within current scientific understandings of the world, as well as relevant to questions that science will never be able to answer like the mystery of origin (Coulson, 1955; Russell, 1998; Stoeger, 1995; Ayala, 1998a). There also has been a general rejection of solutions that posit some kind of absolute dualism or separation of mind from body, as has been found in much of Western thought since the time of Descartes (Brown, 1998a,b).

Is there teleology, a direction or purpose to the universe or God's working in the world? In contemporary science and religion dialogue, there is some variation in points of view, but a common position is that creation is moving toward some kind of an end point but that the process by which that end is reached is somewhat indeterminate and could be affected by human choice (e.g., Davies, 1996, 1998). The alternate position, which is to reject teleology, seems to necessitate the acceptance of a view that life and the universe are without inherent meaning, a position known as **nihilism**.

2.5.3 Science and Values

Hillary Putnam (2002) notes that one of the consequences of the destruction of logical positivism has been the rediscovery of the relation between facts and values. In his view values are "entangled" with facts, neither identical nor strictly separate (cf. Smith, 2001; Midgley, 2002, p. 19). Like Kant, Putnam would argue that moral issues cannot be settled by science, although he would not agree with Kant that they were unrelated. Some relationships between science and values might include the following:

1. Science itself assumes a set of values such as coherence, simplicity, and a concern that we accurately describe and explain the world. These are sometimes called *epistemic values*. These values are presupposed by knowledge of facts.

It is of course a question whether these values are always appropriate outside scientific inquiry.

2. Since every scientist has a set of values that is part of his or her worldview, it may often be the case that these values influence the work of the scientist.
3. Since the results of science and technology have large implications for the human and physical world, the ethical implications of scientific research should be a prominent concern among scientists and others.

This issue of values is especially important for psychology. Most value systems contain a vision of the goods of human life, as well as virtues or vices, and qualities and behaviors that we may possess that will incline us toward success or failure in our pursuit of life goals (MacIntyre, 1984). In a similar way, psychological theories also contain a vision of the goals of human life and how they may best be achieved, so they inherently deal with questions of values and the ethical life (Browning & Cooper, 2004; see e.g., Section 11.1.2).

A contentious area with regard to the role of science is whether it can provide a basis for values and ethics. One position taken by writers is that while science may study ethics and depend on values like progress or rationality for its work, it cannot provide values and thus needs to get them from some external source. This is especially true of sciences like psychology because they are primarily descriptive enterprises. While psychology can evaluate the effectiveness of an activity in moving toward a particular goal, it ultimately cannot evaluate whether a particular goal is good or bad; that requires some kind of norm of the human person and an exploration of possibilities that stands outside of science (Macquarrie, 1982, pp. 3–5). Thus, science cannot provide values although it can determine whether a particular action might promote a certain value (Ellis, 1998). The importance of values for science, coupled with its inability to actually produce and justify those values, suggests a need for respect and dialogue with other fields, a stance taken even by scientists with no religious background or inclinations (Ayala, 1998a).

On the other hand, some scientists believe that values can be discovered by science. In a reductive naturalistic view, we can study the world and conclude from the nature of things what our values should be, a viewpoint taken by some humanistic psychologists (see Section 1.4.5) and evolutionary theorists (see Section 6.2). However, even many evolutionary scientists are skeptical of this possibility (e.g., Ayala, 1998b). Putnam's view is that scientific observation is relevant but is not the whole story. Those against the naturalistic view of ethics often accuse their opponents of what is called the **naturalistic fallacy**: that what is observed is what actually should be, e.g., observed standards of morality are "natural" and should be the goal of moral development.

The attempt to break down the barrier between fact and value is part of a general movement against dualistic understandings of the human person that separate mind and body, thinking and feeling, and events and their meaning. Dualistic approaches have been common among modern Western philosophers such as Descartes and Kant, but do not adequately account for the fact that we are *both* mind and body, thought and feeling, and that these are intimately interconnected (Macmurray, 1957, pp. 62–83). Alternatives to dualism can be developed in several ways. In **monism**

all aspects of the person are seen as part of a single underlying reality. This type of understanding can be achieved through eliminating aspects of the human person that are deemed to be unimportant, as when eliminative materialists claim that all psychology can be understood in terms of brain processes. Monistic understandings can also be developed by imagining that all things are part of a universal oneness, as in varieties of Hinduism. Alternatives to monism are found in **dialogical** theories that argue that things like mind and body are separate but intimately related in some way. For instance, relational theories of human nature argue that both self and other are necessary constituents of our personhood—without both a strong sense of self and a strong orientation to others we cannot exist as unique and mature persons.

2.5.4 Critical Realism

Many of the authors above end up working from a stance of **critical realism**. In science, critical realism is the philosophical position that (1) science is able to give us knowledge of the real world, (2) this knowledge is steadily improving but imperfect because all models are partial, and (3) something like the entities described by science really exist. It also recognizes that knowledge is not directly obtained but involves an interaction between experiment and interpretation. Thus, in the critical realist view it is incorrect to claim that science is just about “fact” and other disciplines about “opinion” (Peacocke, 1993, p. 12; Barbour, 1997, pp. 117, 332; Polkinghorne, 1999b, p. 17). This position allows that there is a subjective aspect to scientific inquiry and that laws are constructions, but it argues that these regularities really do give us a partial understanding of nature that is valid regardless of cultural or social circumstances (Davies, 1996). This realism needs to be critical or willing to question our understandings because science can make mistakes, and some domains of reality like the quantum world have logic and properties that are very counterintuitive (Polkinghorne, 1995).

In a dialogue between science and religion, one can also think about theology from a critical realist perspective (e.g., Wright, 1992, pp. 32–37). In this view, theology and religion do provide us real information about God or ultimate reality and our relationship to it. This information is limited and inadequate and thus should be subject to critique, but both the knowledge and the language used to describe it are unique and necessary. Like science, religions also have processes of discernment by which they select data or evidence and test it against a variety of sources, which may include things like common sense, authority, and communal views or traditions. They assume that there is false religion that must be weeded out (Ellis, 1998). Thus, in a critical realist view of science and theology, both disciplines can be thought of as approaches to learning about reality (Peacocke, 1993, pp. 14, 20). Variants of critical realism such as **fallibilism** are less optimistic, arguing that while we can make positive statements about God, in practice it is difficult to construct and test such models because of the effects of pre-existing cultural and ideological structures (Hustwit, 2007).

2.5.5 Models for Science and Religion

Given the above, how should we approach the relationship between religion and science? Ian Barbour (1997, pp. 77, 90) has produced the most influential typology of views on this topic. He describes four models—conflict, independence, dialogue, and integration. *Conflict models* assume that there is an inherent incompatibility between scientific and religious thought, as in positivist metaphysics. *Independence models* argue, like Francis Bacon, that science and religion deal with separate areas and kinds of knowledge. *Dialogical theories* suggest that there is a relationship between science and religion, but it is a more distant one concerned with presuppositions, limit questions, and methodological parallels. *Integration* involves several possibilities: natural theology (we can find evidence of God in nature as revealed by science), a theology of nature (nature and science help us reformulate theology), and systematic synthesis as in process philosophy. Barbour's typology has been critiqued, for instance, by Stenmark (2004, pp. 257–259). He points out that Barbour's typology does not reflect the real historical process of model development and that terms like “integration” mean different things at different points in history. He also points out that the typology does not deal with the problems of expansionism, whereby science or theology try to take over the traditional domain of the other, a prominent feature of the science and religion relationship both in the past and today.

The overall effect of the general science and religion dialogue is hard to judge. Some observers would claim that there is a trend in science in the direction of a less eliminative stance toward religion, even within evolutionary biology, and an attitude that science and religion can work toward occasional shared goals (e.g., Bering, 2004; Cicirelli, 2006). Despite the presence of dialogue, hostile attacks on religion from scientists and scientific philosophers have continued, in particular from those associated with evolutionary biology such as E. O. Wilson, Richard Dawkins, and Daniel Dennett. They recount with somewhat more sophistication the standard positivist view of history, which is that religion is nonsensical, primitive, and harmful and will eventually be replaced by science. John Haug (1998) has argued that these attacks are personal, ideological, or metaphysical in nature rather than scientific. George Ellis (1998) has argued that while these attempts may result in more power for science, the arguments are flawed because they are based on the following:

- Unjustified and often unstated assumptions or restrictions that are based in metaphysics, not science
- Misrepresentations of scientific findings
- Misrepresentation or dismissal without substantive argument of any positions or data contrary to their view
- Lack of understanding about the views of many religious people toward changing understandings of the human and natural world.

Much remains to be done to put the dialogue between science and religion on a firm and constructive basis.

2.6 Conclusion

Key issue: *Although positivist approaches to science have been largely discredited, they remain prominent within psychology, hindering our understanding of the human person and the dialogue with religion. A critical realist position is more philosophically defensible and helpful to the process of dialogue.*

Religion and science both relate to totality and infinity. When St. Paul encounters Christ on the road to Damascus or Einstein expresses wonderment at the natural world, they are encountering the transcendent part of life, although in science this quality of unpredictability might be known by other names such as “indeterminism” in quantum theory. The great efforts of Christian theologians to produce systematic theologies or statements of the Christian faith are efforts toward totality, just as when psychologists try to develop a comprehensive, naturalistic model of the human person. In the religious view, however, any model of totality will fail because it will be unable to reduce infinity to totality. Infinity cannot fit in a box! However, we need predictable ways of understanding the world around us, so both infinity and totality seem to be necessary parts of life that are in tension with one another. The dialogue between science and religion is a necessary and exciting part of that tension. Dialogue can facilitate understandings that support academic study and practical appropriation. It also has the potential to create new ideas that may be useful to both science and religion.

The Baconian and positivist vision of science as a tool for human power that will progressively wipe away ignorance and lead to an ideal human society has an ambivalent status at the present time. It contains a vision for the past and future that is widely accepted within psychology, and certainly science has given us advances in medical technology and other areas that have led to increased comfort, health, and longevity. Few people would want to give up these benefits. On the other hand, this view is under increasing pressure for a number of reasons (Taylor, 2007):

- A rejection of positivist views of science and history by philosophers and scholars
- The failure of rational secular experiments in social makeover, such as occurred in Stalinist and Maoist communism, or in Western societies such as in welfare systems and public housing projects
- Increasing environmental degradation such as global warming due to our instrumental, technological focus on nature
- Awareness that positivist views are metaphysical positions that shield us from confronting transcendence and the limitations of science, because it is assumed without proof that the advances of science have no boundaries

This puts science in the dangerous position of making claims it cannot fulfill and is ultimately bad for science.

The positivist stance of reductive naturalism also has an ambivalent status within psychology. It has been a powerful tool for simplifying the bewildering diversity of human behavior, looking for patterns that can increase our understanding. However,

it does so by ignoring the particular and unique features of individuals in their life situations, seeing them as interchangeable and replaceable, depersonalizing them. Its emphasis on the lawlike quality of some behavior patterns also leaves little room to consider human freedom and transcendence, as well as more relational views of the person. This can be a particular problem when dealing with areas of human behavior such as ethics. While modernity with its emphasis on reduction of life to general rules sees morality as seeking an ideal rational code for behavior, others argue that morality is relational in nature and complex, relating to a variety of events, situations, and goals. Thus, it will always escape systematization and is best thought of as related to general principles or goals.

While reductionism in general has its advantages, it also has its dangers. The problem is that when we simplify, we risk eliminating things that need to be understood and are part of a complete picture of the world. This leaves us in a worse position than when we started (Zizioulas, 2006; Taylor, 2007, pp. 704–707). Reductionism may lead to these kinds of problems when it assumes that all aspects of religion can be explained psychologically, arguing that religion is nothing but social support or beliefs about morality (Watts & Williams, 1988, pp. 1–3). While scholars should be free to adopt a naturalistic perspective, they should be under no illusion that this is a neutral stance, or that when they use such models to explain religion that they have completely described what religion is or what it means to its followers (Smith, 2000). It is also well to keep in mind that explaining the immediate or proximate cause of something in no way answers questions about the ultimate cause of things. Such judgments put scientists who deny transcendence in the position of claiming they can transcend appearances and make religious pronouncements, a position that is self-contradictory (Cooper, 2007, pp. 30, 88).

The critical realist perspective offers an alternative to positivism. It avoids overly simplistic and reductionistic views of the world, while at the same time offering a positive assessment of how psychology and religion can both contribute to our understanding of the human person. It has provided a constructive platform for dialogue between science and religion and has the potential to enliven the more specific conversation between psychology and religion as well.

With this brief view of science in mind, we now move to an examination of some major religious perspectives.



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