

# Search for an Epistemology: Three Views of Science and Religion

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Religious doctrines would do well to withdraw their pretension to be dealing with matters of fact. That pretension. . . is the source of the conflicts of religion with science. . . .When [religion] seeks its sanctions in the sphere of reality, [it] forgets that its proper concern is to express the ideal. . . .The excellence of religion is due to the idealization of experience which, while making religion noble if treated as poetry, makes it necessarily false if treated as science.

—George Santayana<sup>1</sup>

A CLAIM IS FREQUENTLY MADE that science and religion are not incompatible. The contention is that science and religion can be made to co-exist by compartmentalization, that is, by carefully limiting the scope of each so that neither intrudes on the sphere of influence of the other. Such an approach is folly. Both science and religion claim to be comprehensive and exclusive views of the world. Both make assertions about things that are generally claimed to be within the province of the other discipline. The primary example of such encroachment lies in the question of whether or not there is a God. If either science or religion is constrained to any such arbitrary limitation of scope, it bristles at the restriction and refuses to accept the boundaries of the separation. If science is taken to be Knowledge (investigatable, verifiable, repeatable, etc.) and religion is taken to be Meaning (purpose, values, morality, etc.)—limited definitions and assumptions not happily accepted by either—then science may not be permitted to talk about the "meaning of life" in drawing conclusions about mankind, cosmology, and evolution; likewise, religion may not be permitted to talk about creation or to

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1. George Santayana, *Interpretations of Poetry and Religion* (New York: Columbia University Press, 1990), v-vi.

argue that the knowledge of life, of our existence and history, is bound up with God's plan and man's struggle with good and evil. I think these kinds of limitations are generally unacceptable to both science and religion. And you will note that some areas of major contention, such as history, man's nature, the future, etc., are not mentioned here as belonging to one or the other because they have been the source of heightened and bitter turf conflict over the centuries.

The late Stephen J. Gould, paleontologist, evolutionary biologist, and brilliant essayist, attempts a compartmentalization of science and religion in his book *Rocks of Ages: Science and Religion in the Fullness of Life*. He proposes that the communities of science and religion adopt the principle of NOMA (non-overlapping *magisteria*), in which both scrupulously observe the boundaries of their spheres of influence and leave us a world free of turmoil. "People of good will wish to see science and religion at peace. . . I do not see how science and religion could be unified, or even synthesized, under any common scheme of explanation or analysis; but I also do not understand why the two enterprises should experience any conflict."<sup>2</sup> Gould's position is a thoughtful one, but ultimately it founders on the hard heads of those in both communities who refuse to observe the boundaries. In truth, it goes against human psychology to maintain two systems. We want a single view of the world, and there will always be those in both communities, not as wise or tolerant as Gould, who assert the primacy of their view over all others. The important part of Gould's statement above is that he sees no ground for a unification or synthesis of the two views. The conflict of science and religion is a serious problem that cannot be ignored because both systems of thought present ideas about the same problems and those ideas inevitably lead to conflict and misunderstandings of both scientific theory and of religious belief.

The sage Hugh W. Nibley once remarked that "Being expert neither in science nor religion, we are relieved of the responsibility of discussing a theme whose treatment has suffered from everything but neglect."<sup>3</sup> This essay will add to that suffering but will not attempt a reconciliation of the two points of view. It will not discuss religion as a system of knowledge. In part, that is because most *Dialogue* readers already understand the basis of religious knowledge—faith, revelation, scripture, personal witness, prophetic statements, etc. The other part of that limitation is that such a treatment of religious epistemology doesn't lend itself to scientific analysis. Religion is based on faith, not on facts. This essay attempts to evaluate the current state of affairs between the competing realms of science and religion when religion is expressed to some degree as anti-science. While this essay addresses the conflict between science and religion, the underlying question is really one of science or anti-science. I rec-

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2. Stephen J. Gould, *Rocks of Ages: Science and Religion in the Fullness of Life* (New York: Ballantine Publishing Group, 1999), 4.

3. Hugh W. Nibley, *The World and the Prophets* (Salt Lake City, Deseret Book, 1954), 115.

ognize that religion is not the same as anti-science and that religion is not limited to anti-science; religion, nevertheless, poses a major challenge to the scientific way of thinking and working. Religious sources of knowledge are unscientific in that they are not verifiable, repeatable, or accessible to scientific experiment, and religious knowledge is not correlated to other branches of knowledge. With those differences are included many of the religious conclusions about science and the world that are drawn from that specific religious knowledge. Sterling McMurrin said it well: "Religion is not science. . .it is not essentially a body of ideas and should not suffer the fate of being categorized, analyzed, generalized, and systematized. It is an experience of the numinous, a confrontation of the divine mystery, an ultimate concern and commitment."<sup>4</sup> But, religion is specifically anti-scientific when it asserts conclusions and methodologies that are contrary to events or principles that have been or can be investigated in a scientific manner.

McMurrin's careful distinction poses a further problem for organized religion. If, as he asserts, religion is a fundamentally individual experience of faith and commitment rather than an exercise in study, intellectualization, collective history, and/or living in a real-world community, what then is the basis on which religious community and authority are established? In other words, how does private belief or experience translate into public real world living? A community based on religion almost invariably proposes that some members, for example Joseph Smith and successive prophets, have superior gifts of discernment, and the authority to rule the community derives from the superiority of those gifts. The religious community collectively accepts the commitment to rules of behavior in its adherence to that authority. If McMurrin is right, then leadership authority generalizes a private view to the community, and therein lies the problem. If religion is only a personal experience, not subject to real-world conditions, then there is no public authority and no basis for practical community. Religion can't have it both ways: either it is only a personal, private experience beyond scientific analysis, or it is a worldly phenomenon subject to the scrutiny of worldly analysis. If members of the religious community are asked to do this or that "because God has revealed it to be this way," then it becomes a matter of examining whether it really is this or that way.

It is worth noting that some religions, generally liberal Protestant ones, have largely abandoned the anti-scientific stance. Many of those religions perceive their role not as challenging science but rather as trying to provide reasons and encouragement for moral living. They are prepared to acknowledge the unscientific nature of scripture, particularly Genesis, and are willing to move many religious stories (virgin birth, miracles, resurrection, etc.) into the realm of interpretive psychology or mythology. On the other hand, many conservative

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4. Sterling M. McMurrin, *Religion, Reason, and Truth: Historical Essays in the Philosophy of Religion* (Salt Lake City: University of Utah Press, 1982), 18.

religions have built much of their daily preaching and theology on anti-science. Their first point of emphasis is usually the literal nature of the Bible as the Word of God. This literalism conveniently ignores the differing literalism of other sects, the history of the biblical written tradition, the widely differing content of its texts, or the existence of other sacred texts. Higher criticism of the biblical text is treated with the same disdain as science because it uses scientific criteria for its conclusions rather than the revelatory interpretations of the preacher. Conservative religions actively attack evolution and other modern scientific work as well as scientific methodology. Mormonism has moved more and more into this camp, and its leaders have often warned its members about the dangers of science. Many of us know stories of young people having been advised not to pursue careers in science because it will lead them astray and because science is not the real way to acquire valuable knowledge about their lives and the world.

The changed world after September 11, 2001 has focused our attention on a clear, though little-understood, example of the long-term consequences of an anti-scientific orientation. Hatred of American culture and commercialism—and of the science on which they are based—is a force driving the Islamic terrorist movement. The Islamic world, with some notable exceptions, long ago adopted this anti-scientific orientation and consciously chose to reject modernity in favor of a more conservative, literalist adherence to the principles of the Quran. This decision has long historical roots that are brilliantly described in the book *What Went Wrong?* written by my Princeton neighbor, Bernard Lewis.<sup>5</sup> Lewis recounts the history of Islam and its dominance over Christianity, starting in the 6th century as it practiced its proselytizing by conquest. Islam's successive conquests encompassed most of the medieval world and led to an arrogance that for a time defined the pinnacles of culture and civilization as those embodied in the principles and ideals of Islamic religion; everything outside was barbaric and unworthy of attention. As the Renaissance (literally re-birth) took hold in Europe, Islam responded to the challenge by adopting some limited Western innovations, chiefly military in nature and application, but maintained a conviction of the superiority of Islamic culture and rejected any commitment to "progress" or change.

This attitude has persisted to a remarkable degree in a world elsewhere becoming increasingly modern and scientific. The western world experienced explosive growth and power from industrialization and the application of science and technology. Even as the modern Western world (they would say "Christian world") overwhelmed Islam in power and wealth, Islamic leaders continued to respond to the challenge by calling for closer adherence to their religious traditions rather than adopting or adapting to Western innovations. The Islamic Middle East remains the most insular and (excepting military technology) scientifically backward area in the world. The World Bank reports that, excluding

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5. Bernard Lewis, *What Went Wrong? Western Impact and Middle Eastern Response* (New York: Ballantine Publishing Group, 2002). It is interesting that this book was written prior to 9/11/01.

revenue from petroleum, the collective trade economies of the entire region are similar to the trade economy of Finland. Access to the Internet is available to less than 0.5% of the populace. The roles of men and women are rigidly defined in ways that, from a Western perspective, abuse and repress women so as to result in the loss of the skilled contributions of 50% the populace. There are important distinctions between modernization and Westernization in the Islamic mind, but the point remains that the dominance of anti-scientific religious ideas in the larger culture has enormous consequences for the growth of individuals, cultures, and nations.

This example shows the power of a religious system, Islam in this case, to construct a highly refined culture.<sup>6</sup> At the same time, this example shows the danger engendered when that system expresses its religion as anti-science. Theology is a world and a discipline all its own with a rich and valuable tradition of scholarship and commentary on morality and philosophy. Theology is not, however, cumulative in the way that science is, nor is it beholden to other disciplines nor to community consensus nor external evidence as is science. Hence, I believe, religion is finally less attractive as an epistemology, a means of understanding the world around us.

In this essay I will present the views of two men, one representing a scientific and the other an anti-scientific view. Steven Weinberg expresses the view of science and Bryan Appleyard presents a view deeply skeptical of science from an historical and philosophical perspective. While these points of view are personal to these two individuals, they are generally representative of polar views about science. I have chosen an anti-science spokesman for the religious perspective because the views of most religionists may be anti-scientific, but they generally do not address science itself, or they don't understand science well enough to do it in a focused way.

Readers might also quibble over the selection of one spokesman over another—certainly there are many candidates available. I have selected these two—and quote extensively from each—because in a precise and eloquent way they move the discussion of religion vs. science well beyond the circle of familiar bromides in which it has for so long been trapped. Moreover they engage each other fairly directly on the same ground. Of course, science, anti-science, and religion have many other spokespersons and points of view advancing their own arguments. These limitations are designed to keep the argument to a reasonable scope.

## THE VIEW OF SCIENCE

Steven Weinberg is one of the leading physicists of the 20th century. He accomplished a major theoretical synthesis in physics in unifying the weak and the strong nuclear forces. He was awarded the Nobel Prize in Physics in 1979 and

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6. The other great monotheistic religions, Judaism and Christianity, separated the political culture from the religious culture; Islam did not.

the National Medal of Science in 1991. He has published a number of books for general readers describing science and its meaning, including a description of the events of the Big Bang called *The First Three Minutes*.<sup>7</sup> The American Association for the Advancement of Science sponsors a Program of Dialogue between Science and Religion. In 1999 Weinberg was asked to participate in this discussion and later prepared an essay, "A Designer Universe?" that appeared in the *New York Times Review of Books*.<sup>8</sup> It is from that essay that much of this material is drawn.

For many scientists who express a belief in God, their God is what has been called a "God of the Gaps." In the history of scientific understanding, the idea of God was sometimes used to fill in the gap between areas of scientific understanding. We understand stars and the Universe, but not the creation of the Universe itself, so God fills the gap and is described as the architect who started it all. We understand the variety of organisms and how they evolved, but not how the first one existed, so God is the source of life. We understand the complexity of animals and life, but not the special intelligence of human life, so God is the source of the spark of the human soul. This latter notion is expressed by Michelangelo's artistic portrayal on the ceiling of the Sistine Chapel with God reaching out to touch Adam's hand.

Weinberg believes that it is time to give up on the "God of the Gaps." While there are many things that scientists do not yet understand, almost all of the big gaps have been filled. We understand how the Universe started. We understand how life began and how it has proliferated with such success and variety. We understand the special position of human life and realize that this difference is one only of degree, not of type or quality. We know that other animal species are self-aware. Other animal species have language, tool-making ability, altruism and sympathy, and so on. Weinberg says, "As far as we have been able to discover the laws of nature, they are impersonal, with no hint of a divine plan or any special status for human beings. In one way or another, [we] struggle with the necessity of facing up to these discoveries."<sup>9</sup>

In "A Designer Universe?" Weinberg begins by asking what such an intelligent designer would be like.

It used to be obvious that the world was designed by some sort of intelligence. . . . Above all, the wonderful abilities of living things seemed to point to a creator who had a special interest in life. Today we understand most of these things

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7. Steven Weinberg, *The First Three Minutes* (New York: Basic Books, 1993).

8. Reprinted in, Steven Weinberg, *Facing Up: Science and Its Cultural Adversaries* (Cambridge, Mass.: Harvard University Press, 2001). Also available in *The Best American Essays, 2000* (New York, Houghton Mifflin, 2000) and *Best American Science Writing, 2000* (New York, Ecco, 2000).

9. *Facing Up*, 233.

in terms of physical forces acting under impersonal laws. We don't yet know the most fundamental laws, and we can't work out all the consequences of the laws we do know. The human mind remains extraordinarily difficult to understand, but so is the weather. We can't predict whether it will rain one month from today, but we do know the rules that govern the rain, even though we can't always calculate their consequences. I see nothing about the human mind any more than about the weather that stands out as beyond the hope of our understanding it as a consequence of impersonal laws acting over billions of years.

There do not seem to be any exceptions to this natural order, any miracles. I have the impression that these days most theologians are embarrassed by talk of miracles, but the great monotheistic faiths are founded on miracle stories—the burning bush, the empty tomb, an angel dictating the Koran to Mohammed—and some of these faiths teach that miracles continue to the present day. The evidence for all these miracles seems to me to be considerably weaker than the evidence for cold fusion, and I don't believe in cold fusion. Above all, today we understand that even human beings are the result of natural selection acting over millions of years. I'd guess that if we were to see the hand of the designer anywhere, it would be in the fundamental principles, the final laws of nature, the book of rules that govern all natural phenomena. We don't know what the final laws are yet, but as far as we have been able to see, they are utterly impersonal and quite without any special role for life. There is no life force. As Richard Feynman has said, when you look at the universe and understand its laws, "the theory that it is all arranged as a stage for God to watch man's struggle for good and evil seems inadequate."<sup>10</sup>

One of the most controversial sections of Weinberg's essay is his treatment of the problem of pain. It is controversial because, in effect, he pursues religion into an enclave where it has generally felt itself safe from the incursions of science—the arena of values and morals:

The prevalence of evil and misery has always bothered those who believe in a benevolent and omnipotent God. Sometimes God is excused by pointing to the need for free will. . . . It seems a bit unfair to my relatives to be murdered [in the Holocaust] in order to provide an opportunity for free will for Germans, but even putting that aside, how does free will account for cancer? Is it an opportunity of free will for tumors? . . . The prestige of religion seems today to derive from what people take to be its moral influence, rather than from what they may think has been its success in accounting for what we see in nature. Conversely, I have to admit, that although I really don't believe in a cosmic designer, the reason that I am taking the trouble to argue about this is that I think that on balance the moral influence of religion has been awful.<sup>11</sup>

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10. *Ibid.*, 232.

11. *Ibid.*, 240.

Weinberg points out that there are endless historical "examples of the harm done by religious enthusiasm, and he cites a few. Then, however, he points to one example sometimes cited as a benefit of the moral influence of religion, the suppression of slavery. He argues, however, that closer scrutiny provides a very different view. While it is true that many abolitionists had religious motivations, Christianity and most world religions lived comfortably with slavery for centuries. The abolition of slavery in England occurred because of the non-religious influences of rationalism. Weinberg summarizes:

As far as I can tell, the moral tone of religion benefited more from the spirit of the times than the spirit of the times benefited from religion. Where religion did make a difference, it was more in support of slavery than in opposition to it. Arguments from scripture were used in Parliament to defend the slave trade. . . .With or without religion, good people can behave well and bad people can do evil; but for good people to do evil—that takes religion. . . .One of the great achievements of science has been, if not to make it impossible for intelligent people to be religious, then at least to make it possible for them not to be religious. We should not retreat from this accomplishment.<sup>12</sup>

These are strong statements. Weinberg asserts that all of science denies the existence of God. Further, he condemns religions of all sorts for intellectual bankruptcy and for certain actions done in the name of God. He clearly believes that the world would be a better place without the contentions of religious groups and the behavioral structures constructed in the name of religions. It was a revealing exercise for me to try to imagine the course of history as it might have been without the presence of religion or the actions of religious groups. For example, what might European history or the Middle East look like without the Crusades? But of course the roots of the Crusades extend back to the Islamic conquest of Jerusalem, and still further back to the inheritance decisions of patriarch Abraham.

### THE VIEW OF ANTI-SCIENCE

Of the many types of anti-science, some are simply designed to further self-interest, such as the reported sightings of aliens and UFOs by tabloid journalists or miracle cures promoted by unscrupulous medical charlatans. Other prominent examples are Biblical Creationists. Employing inaccurate or selective data from scientific sources, Creationism is genuine anti-science in that it denies the foundation and methodology of scientific operation even as it employs the label of scientific thinking. Creationism is also a political movement with a political agenda in churches, educational institutions, legislatures, and in the homes of true believers.

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<sup>12</sup> Ibid., 242.



More thoughtful critics of the enterprise of science as it operates within society, especially in our century, claim that science is a destructive force in our culture. Some, such as Oswald Spengler, argue that science is ultimately a self-destructive force in society and doomed in its own operation. Others, like Václav Havel, directly challenge the Jeffersonian model of scientific public policy and submit that science is an enterprise fundamentally disruptive to our social fabric.<sup>13</sup> Havel's perspective is not a familiar one since his, and his country's, view of science were drawn from Soviet science that was malformed and constrained by Communist politics. Soviet science, including such egregious abuses as Lysenkoism,<sup>14</sup> is not representative of real science, but does provide a cautionary illustration of what happens to science when it is directed by an authoritarian system.

Anti-science has had many champions over the years. Some, like Spengler, have been hugely influential in modern culture. In his enormous work *The Decline of the West* (1918),<sup>15</sup> Spengler proposes a kind of historical determinism for various cultures. This kind of encyclopedic cause-and-effect analysis of civilizations through the course of history is not for the faint of heart. Spengler, like Gibbon before him and Arnold Toynbee and Theodore Roszak after him, attempts to create a model for the rise and fall of civilizations by finding common elements of growth and decay. His analysis seeks to identify the fatal flaws in our civilization as well as in earlier civilizations. He predicted the demise of our modern age by the year 2000.

Spengler's work has remained a topic of heated discussion for decades. It has spawned many similar treatments including several New Age and counter-culture books and theories. The Spenglerian model grows from an uneasy marriage of German *Naturphilosophie* with the early philosophy of Friedrich Nietzsche. Using the metaphor of the seasons, Spengler asserts that each historical epoch begins with a springtime flowering in an "Apollonian" spirit, a world view and culture of organic forms, art, and of faith. This changes slowly into a

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13. Václav Havel, "The end of the Modern Era," address given at the World Economic Forum, held in Davos, Switzerland, 1992, reported in summary form, *New York Times*, 1 March 1992.

14. Lysenkoism is named after a non-scientific peasant plant-breeder Trofim Denisovich Lysenko [1898-1976]. A powerful Communist functionary, Lysenko was the leading proponent of a view of evolution that rejected "natural selection" and genetics. Under his guidance, science was not directed by the most probable theories tested through controlled experiments, but driven instead by state ideology. The result was the steady deterioration of Soviet biology and the misdirection of huge amounts of capital into agricultural failures. Meanwhile, scientists either groveled, confessing their errors publicly and embracing the wisdom of the Party, or they were fired. Some were condemned and sent to labor camps. See <http://skeptid.com/lysenko.html>.

15. Oswald Spengler, *The Decline of the West*, Abridged Edition, trans. Charles F. Atkinson (New York: Oxford University Press, 1991). Spengler's *Der Untergang des Abendlandes, Umriss einer Morphologie der Weltgeschichte* is insipidly translated as *The Decline of the West*. It would—in a more literal translation—be entitled something like: "The Demise of Western Civilization, Sketches of a Morphology of World History."

romantic longing for the transcendent (*Sehnsucht nach dem Übererdischen*) during the heat of summer. Next, in the autumn of a culture, this view becomes intellectualized—as happens in the tale of *Faust*—a process by which "culture" evolves into mere "civilization," the winter of the epoch. A major component in this change is the rise of science within the society. Ideas of personal destiny are replaced by ideas of causation. Cause and effect analysis replaces the notion of a natural order in life. Mathematics remakes the tangible world into arid, scientific abstractions. Quality of life degenerates into budgetary priorities and human associations become regulated by governments. The idea of government acting as a servant to people is replaced by government acting in its own interest in the ruthless pursuit of power. The idea of scientific causation is forced onto the "natural" phenomena of the world.

Spengler wrote this book during WWI and the decade preceding. European culture was everywhere in upheaval, and he used the most recent developments in physics as supporting evidence to demonstrate the failure of science, not realizing that those years were a time of crisis in physics, the collapse of the old Quantum Theory, soon to be resolved by major new developments. He dismisses quantum mechanics and relativity as "card houses of hypotheses" created with a kind of desperation in the face of intellectual failure. He points to the increasing use of statistics and statistical arguments as evidence of science's failure to achieve its aim of exactness. To Spengler, this illustrates the compromise of science's aims, philosophy, and honesty. He also points to the increasing reliance in science on formulas and symbols (abstraction rather than tangible models), which ironically prepares the winter civilization for a new spring because, in his historical analysis, simple numerical regularities and patterns inspire the birth of religious belief and ritual. Numerical mysticism appears in every new faith, and thus to Spengler, the form of 20th century physics not only points to its demise but also to the immanence of a new epoch, which, arising from the arid exhaustion of science and abstraction, will be infused once again with religion and mystery.

A more recent spokesman for this kind of viewpoint is Bryan Appleyard, an influential British writer on science and philosophy with an important weekly column in *The Sunday Times* (London). He has published a number of books, but most of the material quoted below is taken from *Understanding the Present: Science and the Soul of Modern Man*.<sup>16</sup>

Appleyard presents a fairly complete and accurate history of the development of modern science and with polemical style identifies several villains, especially Galileo and Newton, who disrupted the comfortable harmony of man and the world by letting telescopes and mathematics intrude. Newton especially comes in for criticism. It was Newton who replaced the divinely informed world

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16. Bryan Appleyard, *Understanding the Present: Science and the Soul of Modern Man* (New York: Doubleday, 1993).

of Aquinas and Aristotle with the cold mathematics of the modern universe—neutral, mechanical and devoid of value.

In the weak sense Newton may have celebrated the magnificence of God by demonstrating the overwhelming order of his creation. But, in a much stronger sense, he had demonstrated the power of specifically human reason, unaided by God. Man could now see immense distances, he could forecast the future, he could understand what he could not experience. Was not Newton's real achievement to turn men into gods?<sup>17</sup>

Appleyard continues his history of science by describing the separation of humanity from knowledge by adding the work of Darwin and Freud to the story.

First Copernicus had turned us into a cosmic speck, secondly Darwin had robbed us of any privileged position in creation, and finally. . . Freud had shown that man was not even master of his own mind. But the scientific procedure offered the possibility of a controlling mastery. "Man's observation of the great astronomical regularities," Freud wrote, "not only furnished him with a model for introducing order into his life, but gave him the first point of departure for doing so."<sup>18</sup>

The 20th century is a turning point in Appleyard's history:

The public image of science changed in our century. It changed because the smiling mask it had been wearing suddenly fell away to reveal a face that was as horrible as it was wonderful. Primarily this happened because science over the last hundred years has become so visible to so many. A technological explosion as well as environmental anxiety, nuclear weapons, mechanized total war and all the moral and political complexities of economic growth have put science at the center of the public realm. It has been brought to trial before a new kind of jury, the jury of popular sentiment, whose verdicts are cruder and whose anxieties are more politically potent than those of the philosophers. Suddenly science's achievements can simply be viewed as crimes, its knowledge as sin.<sup>19</sup>

Here Appleyard is pointing out that some of the traumatic consequences of science, of its straightforward technological application through mechanized war, for instance, or industrialization with all its attendant social displacement, have lead in the public imagination to the condemnation of science as a kind of Dr. Frankenstein. Meanwhile, however, the classic, mutually exclusionary philo-

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17. *Ibid.*, 58.

18. *Ibid.*, 72.

19. *Ibid.*, 130.

sophical definitions of science and religion have provided science with an easy rejoinder to such accusations.

The division between scientific knowledge and the world produces a cast-iron moral defense [for science]. The question of whether to employ the atomic bomb, the scientist will argue, is precisely the same as the question of whether one uses a gun. A discussion of the moral status of the weapon is irrelevant or meaningless; all that really matters is the soul of whoever might pull the trigger. Nothing has changed except the effectiveness of the tools, the scale of the possible error.<sup>20</sup>

This, of course, is a more elaborate formulation of a familiar kind of defense of technology: "Guns don't kill people; people do." Appleyard, however, finds this kind of logic deeply suspect. He describes our current position:

Relativity, quantum theory, and chaos reveal the style of our new science. As the nineteenth century ended in a mood of sublime confidence that human knowledge was nearing completion and our power, through the application of that knowledge, was approaching that of the gods, so the twentieth century began—and has continued—by destroying the foundations of that confidence. Extraordinarily, that process of destruction has taken place both from outside science and from within.<sup>21</sup>

Finally, Appleyard comes to his conclusion: "Science made us, science broke us; it is time to start making repairs." In other words, science engendered our optimism that human knowledge would master the world and its problems, but then it was science itself that dashed those hopes and has since even incorporated the failure as part of its theoretical basis. Science is and has been a fundamental part of the problem all along. He lists a few of the efforts made to "repair" this circumstance and rejects each in turn. These attempts include:

*Environmentalism.* "Environmentalism has expanded to become an entire moral, social and political orthodoxy. As such it has joined forces with a whole range of other anti-progressive movements which advocate the abandonment of economic growth and the return to 'natural' ways of life. . . . [T]he purpose side of the ecological deal says only that we have an obligation to survive—scarcely a significant spiritual insight."<sup>22</sup>

*A Return to Orthodox Religion.* "Liberally redefining the faith to embrace or co-exist with science [the Widtsoe, B.H. Roberts, et al, position] is unconvincing because it is too obviously trying to make the best of a bad job. . . . It merely attempts to pretend it is not a problem."<sup>23</sup>

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20. *Ibid.*, 131.

21. *Ibid.*, 156.

22. *Ibid.*, 214.

23. *Ibid.*, 215.

*A New Spirituality of Science.* "In one form this could—and does in writers like Bronowski, Sagan, Hawking, Feynman and Hofstadter—arise from our straightforward acceptance of the progressive, evolutionary vision that science provides. . . . Its proposition is, in essence, that science is the truth, there is nothing we can do about it, so might as well submit. Philosophers have colluded with this. . . . [But] I believe it is self-evident that, if we are to have philosophy or religion, the first qualification of any claimant to those titles must be that they are different from and independent of science."<sup>24</sup>

*A New Spirituality Arising From Within Science.* "By this I mean the hope many have derived from modern developments like quantum mechanics and chaos theory. Some—like Fritjof Capra—say these point to a possible future convergence between ancient religious insights and new scientific ones. Others—like David Bohm—attempt to construct entirely new visions based on the anti-mechanistic tendencies of the new science. But. . . science is mobile, its very nature is constant change. One generation's certainty is quite likely to be overthrown by the next. It may be true that quantum mechanics points to a deeper, spiritual realm—but the knowledge of that truth must come from outside and be independent of the quantum, otherwise it remains dependent on the whims of science."<sup>25</sup>

With a good deal of courage, Appleyard advances a solution to the difficulty. Unfortunately, it is a complicated argument based on the idea of "private languages" presented in the philosophy of Ludwig Wittgenstein. But, in fact, it also seems to be the central argument of our time against the rational hegemony enjoyed by science since the Enlightenment.

A private language would be one that only had meaning to the user. The example is employed of a man who wishes to record the experience of a particular sensation in his diary. It is not a pain or an itch, there is no word that describes it. So he uses the letter "S" to record each occurrence of this sensation. Now this letter "S" might be taken to be a word in a private language that has meaning only to the man. But Wittgenstein concludes that it is not, rather that such a word is quite meaningless. The point is that, in order to get to the word "S," the man had to go through the language we all use. To say that "S" stood for the sensation requires him to employ the word "sensation." He cannot isolate himself and his words from the public realm of language. He must have language before he can have the concept of sensation. There cannot be such a thing as a private language because language is, by definition, a public thing.

As I have said, this may seem to be a technical point. But place it alongside Descartes and its profound significance begins to emerge. Descartes's cogito, ergo

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24. Ibid., 216.

25. Ibid.

sum was an assertion that the one thing of which he could be certain was his own experience on the basis of his own thinking process. But that ultimately is an assertion of a private language. . . . But Wittgenstein destroys the point: the *cogito* is like "S," and we cannot arrive at it without going first through the public realm of language. Language comes before cogito; language gives us our selves.

Locked in this remote and difficult philosophical work [Wittgenstein, *Philosophical Investigations*, 1953], this is, I believe, the first—and most entrancingly beautiful—sign that we might be in the process of escaping from the loneliness of the classical scientific vision. For, if the scientific self is revealed to be a convention, a delusion Russell would say, then it follows that science too is a convention, a specific choice rather than the privileged road to truth. Science may, at last, be relativized and thereby humbled.<sup>26</sup>

First of all, let's be clear that this is the most serious kind of postmodern argument about epistemology, about getting (or not getting) at truth. It addresses the matter of "discourses," and not of "facts," which in this contemporary view are only available through language conventions anyway. Whatever discourse we use, even the skeptical, questioning, faith-opposed Cartesian language of science, we are locked before we speak into the public convention of words. And if absolutely all "discourses" are a matter of public convention, then all are relative and none, including science, has any more claim on authenticity or on proximity to the "real" than any other. Of course, this would not preclude something like mystical or revelatory confirmations that might not be conveyed in language at all, but through "illumination" or vision or feeling, something available to religion but not to science.

If this kind of thinking about science and philosophy were to win the day, it would constitute a kind of counter-Cartesian (anti-science) revolution, and we would stop talking about getting at or to the "truth" by rational means. I am not persuaded that this is likely to happen. Appleyard misses several fundamental things about science and its operation. It is disingenuous to say that science is a "choice," that the world chose Newton's science over magic as if these were equivalent options. Science works. It has an operational effectiveness and predictive capability that cannot be matched by its competition: magic, religion, philosophy, creation science, space-alien shamanism, or whatever. Science or something like it has always been part of the human condition because as thinking animals, we are inquiring by nature. We have always looked at the stars with wonder and have always needed explanations for our observations.

Moreover, science is unlike other intellectual disciplines in that it deals with the objective world rather than judgments, philosophies, rhetoric, or opinions. The movements of the heavens are real, and the model we choose to explain those motions is demonstrably scientific in nature. The successive replace-

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26. *Ibid.*, 226.

ment of Ptolemaic, Newtonian, and finally Einsteinian cosmology was forced on us because theories were inconsistent with observational data. New models are always available and will eventually be accepted if their accuracy is superior, but the point is that the comparison is done against the observations, not against a subjective philosophy or an argument from authority. Appleyard glosses over this methodology as if there were a conspiracy of scientists. When the nuclear age began, investigation led to the atomic bomb and also to nuclear reactors, nuclear medicine, and glowing watch numerals. It is unreasonable to think that the process of scientific investigation could include or exclude, by choice, any subsequent discoveries. Meanwhile, there is every reason to believe that external, ideological control (the agenda of non- or anti-science) can and does distort, obscure, even eliminate the horizon of possible discovery.

### AN ODYSSEY OF BELIEF

The third view of Science and God mentioned in the title of this essay is my own. Certainly that view is not as profound or as eloquently established as the other two, but it is my own and perhaps has value in the context and autobiography that gave it roots. My credentials as an LDS believer to comment on this subject are good, if rather ordinary. I grew up in the church, served a mission, married in the temple, went to Brigham Young University, and served in bishoprics and on high councils for many years. I am a charter subscriber to *Dialogue* and *Sunstone*. Though "front and center" for most of my church life, I was discontent. I studied Chemistry and Physics at BYU and later at Princeton, then entered a program at Princeton for History and Philosophy of Science where I studied with Thomas S. Kuhn. For some readers, that last sentence probably provided the "Ah hah!" moment in which I've given away my guilty secret, namely that I was led astray by secular influences at a godless university. The fact is that my discontent had much earlier origins in Utah.

As a young man, I probably appeared as too inquisitive and potentially disobedient, especially for a widowed mother with five other children (also bright and challenging) to raise. When I was in my early teens, a kindly uncle gave me what he supposed would be the antidote to my questioning, scientific mind. It was Joseph Fielding Smith's *Man: His Origin and Destiny*.<sup>27</sup> The effect it had was quite the opposite of the one intended. At the time I didn't understand much of what was in the book, but I instinctively knew that it was wrong. I was turned off by its harsh polemic and its descriptions of science that were so different from what little I knew then. It made me distrustful of religion and authority. Looking back over the decades, that was a pivotal point in my intellectual and spiritual life. In some sense, the rest of my life has been spent in resolving the issues raised by that book. But as I moved away from the book

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27. Joseph Fielding Smith, *Man: His Origin and Destiny* (Salt Lake City: Deseret Book, 1954).

over my intellectual life, the official church seems to have elevated it (or allowed its elevation) to near-canonical status. Evolutionary biology may be taught at Brigham Young University, and there may be statements to the effect that the church takes no official position on evolution, but many of the assertions in *Man, His Origin and Destiny*, plainly anti-scientific, have been repeated often and publicly by church authorities, and they even appear in the "Chronology" section of the Book of Mormon, 1992 edition. Once again, the church can't really have it both ways.

I studied the church, doctrine and history, and I studied science, quantum mechanics and relativity. I remained active in the church by yielding to the demands and rewards of service. Yes, I told myself, the lessons and sermons were flawed, but I was able to assist in bringing the work forward. I had certainly not been unaware of the tensions in the church, but I was deeply shocked by the "September Massacre," the orchestrated excommunication of several LDS intellectuals that took place in 1993. Though not a direct attack on me, it seemed aimed squarely at people like me with my intellectual position in the church. It and the events thereafter challenged my senses and orientation like the shocks of an earthquake—the foundation of institutional trust was simply gone, and I found no vantage point within the church on which to stand. I resigned my church callings but continued to attend church though I soon realized that this was a futile attempt to hold on to what was no longer there. I encountered the literal truth of the old jibe: "Organized religion is an oxymoron," for the demands of the organization were, in my view, placed far above the demands of religion. Equally offensive to me was the reaction of the community of the church to these events. It was hard to know which was more incredible, the level of willful ignorance about the people and issues involved or the level of indifference. My fellow church members now appeared to me plainly as members of a cult locked in allegiance to a bureaucratic organization, not as concerned believers each struggling with individual challenges of faith and morality. I was no longer comfortable being in the company of cult members. It was abundantly clear that the organization of the church had failed my particular kind of faith though it took years for me to admit this. I have many good and true friends in the church, but our conversation is much thinner these days since we no longer discuss the busy-work of the organization. I am grateful for those friends and treasure their association, but a lot of shared foundation is gone.

Over the course of my life, I have looked back at some rocky stretches and made some wrong turns, but one constant support has been the life of the mind. For years I walked in a *cul-de-sac* by trying to compartmentalize science and religion; every turning brought me back to the original problem. What I heard in religion did not square with what I saw: not in history and not in practice. I have come to believe in science as an epistemology more than ever, especially in its anti-authoritarian operation. It is authority and caprice that are the enemy. Such authority can only be maintained at the expense of truth. If a principle is true, it needs no support from authority. Authority is a terrible foundation for an episte-



mology. In its own operations, the community of science is non-authoritarian. To be sure, there is a scientific bureaucracy with authority figures and some pretense and coercion, but at the core, science and scientists will always finally yield—be forced to yield—to a new idea if it is more in line with the evidence.

The example of Einstein is often cited. Einstein was an unconventional and very poor student, the absolute lowest in any hierarchy of scientists. After graduation he couldn't get a real scientific position, but worked in a post office. From that position as a freelance physicist, he produced three small papers in 1905. The ideas presented in those papers instantly vaulted him to the very top of the physics community. There was no infighting with the scientific establishment or disdain for his lowly rank; his ideas carried the day. At base, science is remarkably democratic, self-correcting in the face of error, and free ultimately from authoritarian influence. Religion should be the same, but it is not.

Little by little, I realized how profound my denial had been. Separated from the community of hustle and bustle and left with the ideas alone, I thought about science and God, and I realized that God was gone. Deep space and deep time change the perspective of life and the world so profoundly that God simply disappears. Deep space and cosmology make the earth miniscule and insignificant, not center stage. Deep time makes our existence as biological entities a small event in a vast process. I don't believe in a creator of the Universe. I don't believe that mankind is different from other species in any fundamental way or that there is a heavenly parent of our souls. I don't believe that God intervenes in human history. I don't believe our history does or could include an event such as the Atonement that is supposed to have cosmic and universal importance. There is no plan in this process or any indication of Godly benevolence. The sacred texts of the world's religions are so different and so fraught with problems that it is incomprehensible to me that intelligent people continue to take them seriously, either for content, historicity, or consistency, much less build an entire world view on them.

I do not feel like an atheist though what I have said makes it clear that the label is accurate. I am not a person without morals, and I don't consider myself as "godless." This simply means that the reasons for my moral behavior are no longer grounded in belief in God. Rather, they are founded in love of the majesty of creation and compassion for my fellow men. I do believe that the human condition requires a spiritual or religious dimension. Certain principles expressed in religion do form a good and necessary foundation for making moral judgments. But I define those principles very carefully—they are ethical principles, not bureaucratic or authoritarian ones. I am in favor of serving my fellow man, but not in favor of proselytizing. I am in favor of feeding my spiritual soul, but not in the ways of organized religions. I hope that we can come closer to the ideal of universal brotherhood, but I see no hope for it as long as we continue to value labels like Mormon, Catholic, Christian, Jew, Muslim, etc.

In defining my current moral orientation as a non-believer, I'm not happy with words like "spiritual" or "religious," but they express the feeling more than

"internal psychology" or some other made-up phrase. It is clear that human beings are more than scientific automatons, as Appleyard complains. I suppose that I might be labeled an Ethical Humanist. I think that people and societies do have a need to believe in the power of good. I'm fairly certain that that power of good is not the same as religion, and it is certainly not the same as organized religion. Valid spiritual impulses are often harnessed to church creeds as a cynical exploitation of good will.

I believe there is a need for an inner dimension beyond the social connection to our community. I believe it is useful to pray though it's hard to say exactly what that is for someone like me—perhaps it is simply communicating with one's own psyche or resetting one's bio-rhythms. Of more interest and concern to me is the internal life of the mind that needs nourishment beyond sociology and psychology. In that regard, I find great appeal in the critical work of Immanuel Kant. Kant is firmly fixed in a scientific world and argues that our senses and innate categories of experience let us generate perceptions of the world as we search for truth. Kant's famous Categorical Imperative describes a morality or moral pressure for ethical behavior based on conformity to laws of nature and the idea that all men should behave similarly as a consequence. A just society and a scientific morality would be the result.

I find great satisfaction in the life of the mind and, despite Appleyard's relativist objection, literally believe the truth of Descartes' phrase *cogito ergo sum*—I think, therefore I am. I take great delight in music and art and find surprise at the joy and pleasure I derive from these. Why does the brain react with pleasure at things of beauty? Thinking as a scientist analyzing the laws of nature, I believe that I have greater wonder and respect for the world and its creatures than I did when I viewed them as products of a creator. With no expectation of another life, this one and the living of it are more precious. I share the feelings of many Jewish friends who believe that their lives continue in what they leave behind.

Charles Darwin realized the profound changes that his work would generate in society. He realized how deeply the notions of evolution would challenge ideas of God and creation and their place in our culture. At the same time, there were satisfying intellectual substitutes. The final sentence of *On the Origin of Species* (1859) expresses Darwin's pleasure at this new view of the world:

There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.<sup>28</sup>

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28. Charles Darwin, *On the Origin of Species By Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life* (London: John Murray, 1859), 490.

The world makes more sense being driven by natural law than by a distressingly absent God. My mind shares Darwin's sense of grandeur and is satisfied with those conclusions.

Appleyard is right about this much: science is not a final body of knowledge. It is a process of investigation stripped of the limitations and constraints of context and authority. To be sure, those things do intrude on the process because scientists are people, but they do not last long unless there is some element of correctness in them. The cutting edge of science is objectivity. The final recourse is to the object, whether a chemical element, a star, or a mathematical equation. How wonderfully different that is from judgments in other areas of our lives where the final recourse is based on the arguments of lawyers or the Supreme Court's interpretation of a piece of legislation, or business success is based on the persuasiveness of a marketing campaign rather than the real excellence of a product, or where some arbitrarily labeled moral behavior is based on a tortured reading of selected Bible verses or an ambiguous conference talk.

Meanwhile, fundamentalist believers in the Bible and the Quran hold up their "faith" or "testimony" in the face of every challenge without examining either the challenge or the faith. In a *Los Angeles Times* review of Catholic William F. Buckley, Jr.'s, anti-science book, *Nearer, My God*, Martin Gardner describes the problem. "I put down *Nearer, My God* with unbounded admiration for Buckley's courage and honesty, and the depth of his piety. There is not a trace of hypocrisy in his book. I also came away with the sad realization that Buckley is guilty of what has been called the sin of willful ignorance. He has never considered it worthwhile to learn much about modern science or recent biblical criticism, much of it by Catholic scholars. He has made little effort to think through the implications of his beliefs in the light of such readily available knowledge."<sup>29</sup> Such ardent believers are unwilling to live in the real (or scientifically accessible) world, and from my perspective the rejection of science has led them into mental captivity. It has given some over to the control of possibly unscrupulous leadership with political or economic agendas. Their intolerance and fervor lead to the kind of immoral behavior they rail against.

The "sin of willful ignorance" is practiced by many in the Mormon church as a "commandment of obedience." We are counseled by our leaders not to read science or history or anything that is not "faith-promoting." What can that be called except censorship on the part of the authority and willful ignorance on the part of the audience? I will concede that asking questions is a slippery slope. If one asks difficult questions about science and religion and pursues the implications of their answers, the consequences can be profound. I resisted this deeper level of examination for years, but finally faced up to the need to be honest with myself. The answers that I found to questions about science and religion were

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29. Martin Gardner, *From the Wandering Jew to William F. Buckley, Jr.: On Science, Literature, and Religion* (Amherst, New York: Prometheus Books, 2000), 345.

unequivocal and compelling. It may be good advice to avoid the slippery slope of questioning, but I believe it is an impossible strategy in the long run. Though the risk associated with learning may be high, what is the risk associated with ignorance? What is the purpose of going through life without asking questions or limiting questions to easy ones?

It seems to me that the dangers of anti-science and anti-intellectualism are very strong, especially in the church. The example of Islam makes clear the dangers of failing to accept and assimilate science and technology into our culture, on an individual and societal level, especially as they confront religion. The struggle between science and religion may be seen as a battle between progress and ignorance (or between light and darkness, to use a familiar metaphor), and I am very nervous that the battle is not merely metaphoric. I believe anti-scientists of whatever persuasion are clearly wrong in urging us to choose a non-scientific way. I'm convinced that it is dangerous *not* to embrace scientific thinking and scientific methodology. The solutions to our problems lie not in anti-science nor in denial of science, but in doing more and better science and using more scientific attitudes throughout society. We must free ourselves of ignorance and of dependence on non-objective authority. The world and natural law are what they are; we can't select them, but we can learn to understand them. Acting within the world in an ethical, responsible way is predicated on correct understanding of what it is and how it works. *Homo sapiens* are thinking men—that is our name—and curiosity is our key characteristic. The heavens and the earth have scope and history that is astonishing and awesome to contemplate. The mind is discerning and is able with rigor and honesty to discriminate between truth and falsehood.