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SCIENCE & MORMONISM SERIES 1

COSMOS, EARTH, AND MAN

DAVID H. BAILEY, JEFFREY M. BRADSHAW, JOHN S. LEWIS,
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FORGING A FRIENDLY ALLIANCE BETWEEN MORMONISM AND SCIENCE

John W. Welch

Math and science have long been very interesting to me personally. I grew up with my slide rule often at hand in the shadow of CalTech's Jet Propulsion Laboratory in La Cañada, California, in the late 1950s during the launching of the race into space, and twenty years later in the late 1970s, I represented CalTech, Boeing, Lockheed, and Northrop as a tax lawyer in Los Angeles. In 1964 I entered BYU thinking I might major in math and ended up with a math minor. When I got admitted to do graduate work in Greek philosophy under J.C.B. Gosling at Oxford, it was because he, as my tutor, saw my background in math and wanted to pursue further ideas about Greek mathematics and Aristotelian logic. Over the years, math has made me alert to many things, including axioms, evidence,¹ proofs, structures,² arguments, patterns,³ numbers, and numerology.⁴ Most recently I have enjoyed the final salvo in Hugh Nibley's *One Eternal Round*, which in its final chapters connects mathematics, Egyptology, and Facsimile 2 of the Pearl of Great Price.⁵

In preparing this chapter, I have collected and read what I could of the literature regarding science and religion, including substantial amounts written by Latter-day Saints on this subject.⁶ Energized by this reading, my mind has jumped to a new, quantum level of personal understanding, so to speak. At the same time, I am even more aware of the complexities of the social, political, philosophical, and practical issues that confront us here. I hope these polarizing tensions can be reduced. I am still an outsider to these conversations. Philosophy of science is not my field. I am not a Henry Eyring, let alone a Bill Nye, the Science Guy. Yet I humbly hope that I might sketch a few ideas that may point religion and science to a more constructive, synergistic, symbiotic relationship.

Epistemological Principles Shared by Science and Mormonism

As I thought about what I might contribute to this lecture series, I was drawn to a number of very broad epistemological, metaphysical, and cosmological principles. I wondered, How many assumptions or axioms, or meta-theoretic shaping principles might be held in common by Mormonism and strong scientific theory? If we are going to forge friendly alliances between science and Mormonism, it would be helpful if we could find basic ways in which these domains have important things in common. From the following, I want to argue that Mormonism and science are not just yoked at the shoulder but are joined even deeper, at the hip.

Let's explore some of these principles.

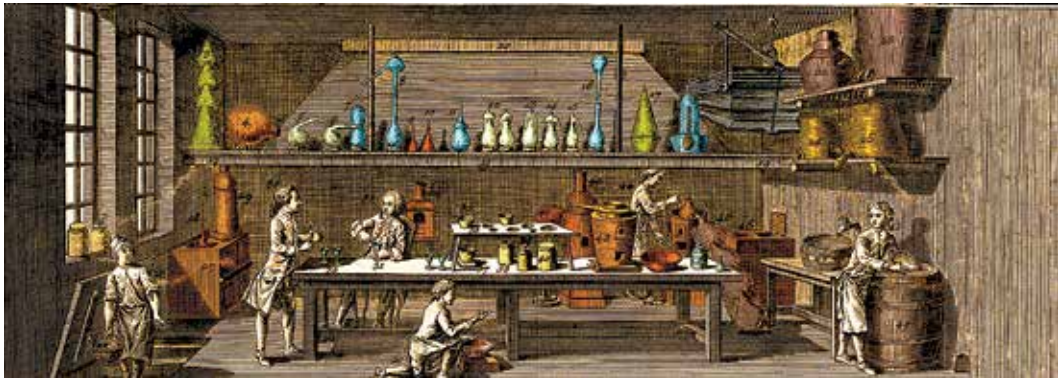


The Milky Way

1. Both science and Mormonism are deeply interested in the discovery of all truth. Many Mormon discussions of science begin with this starting point. Our desire, whether as Mormons or as scientists, is for further light and understanding, and to circumscribe all truths in one expansive whole. The early brethren made strong statements to this effect.⁷ For example: “Mormonism includes all truth. There is no truth but what belongs to the gospel,”⁸ and “It is our duty and calling, as ministers of the same salvation and Gospel, to *gather* every item of truth and reject every error. Whether a truth be found with professed infidels or with the Universalists ... to *gather up all the truths* in the world pertaining to life and salvation, to the Gospel we preach, to mechanism of every kind, to the sciences, and to philosophy, wherever it may be found in every nation, kindred, tongue, and people and bring it to Zion.”⁹ Brigham Young again said: Mormonism “embraces all truth there is in all the eternities of the Gods.”¹⁰ John Taylor added: “Truth, when preceded by the little word ‘all,’ comprises everything that has ever existed or that ever will exist and be known by and among men and through the endless ages of eternity; and it is the

duty of all intelligent beings ... to search after truth, and to permit it to influence them and their acts and general course in life, independent of all bias.”¹¹

I do not know how unique this principle might be, but anyone who shares this principle with us is our friend. In both science and Mormonism, the quest for truth begins with no bounds. For Mormonism, truth is everything that endures with God in the eternities, and among other channels truth comes through revelations and confirmations by the Spirit, with Christ as the light of truth (Alma 38:9). By the power of the Holy Ghost all people may know the truth of all things (Moroni 10:5; Moses 6:61). We certainly do not know all truth yet, but someday we will.



Eighteenth-Century Chemical Laboratory in Paris, Showing Instruments, Furnaces, Chemical Vessels, and Chemists, ca. 1760

2. Because Science and Mormonism seek all truth, both recognize that there are various ways to know truth. Various subjects, tools, approaches, procedures, and methods are involved on both sides precisely because of the variety of things to be recognized, gathered, studied, measured, dissected, and analyzed. Because no one tool can yield all truth, no tool should be disregarded or excluded in our collective quest for truth, including spiritual sources.

For Latter-day Saints, D&C 88:78–79 reveals a broad curriculum involving both religion and science: “Teach ye diligently and my grace shall attend you.” One tool is diligence. Neither good science nor good religion occurs without diligence and hard work. Another tool included here is grace, or the blessings of inspiration, serendipity, and the love of God. Other aspects are mentioned, both spiritual and temporal: “... that ye may be instructed more perfectly in theory, in principle, in doctrine, in the law of the gospel, in all things that pertain to the kingdom of God, that are expedient for you to understand”; and the subject matter of this curriculum is just a broad: “of things both in heaven [astronomy] and in the earth [physics], and under the earth [geology]; things which have been [creation and cosmogony], things which are [chemistry, math, and cosmology], and things which must shortly come to pass [statistics, probability].”

3. Both science and Mormonism explicitly embrace the experimental method. As Dennis Rasmussen wrote in the *Encyclopedia of Mormonism*, “The LDS Church has been less inclined than some other religions to regard the world of common experience as an inferior order.”¹² Three times in Alma 32, vv. 27, 33, and 36, the Book of Mormon tells people to “experiment upon [Alma’s] words,” to try “the experiment,” which Amulek then calls “the experiment of its goodness” (Alma 34:4). Joseph Smith once said that the world would prove him to be a true prophet “by circumstantial evidence, *in experiments*, as they did Moses and Elijah” (TPJS 267) all this sounds like it has something important in common with the experimental methods of modern science.

It is true, as Rodney Brown points out, that Alma’s experiment will disclose the truth and goodness of the life-giving seed, while scientific experiments are designed mainly to disprove things.¹³ But I see here more important similarities than differences. In Alma’s experiment, if the seed does not grow, one has disproved its viability, so in that sense, religious and scientific experiments are still both experiments leading to a knowledge either of or about some aspect of truth.

And concerning the alleged difference between religious and scientific experiments that scientific experiments are observable, public and repeatable, it is well worth noting that some revelations have been shared experiences, as in the cases of the Three and the Eight Witnesses, and the manifestations at the dedication of the Kirtland Temple.¹⁴ The fact that spiritual experiences have occurred over and over again in my life, as in the lives of most Latter-day Saints, says something about the repeatability of spiritual experiments and manifestations. I do not know how many other religious would put it this way, but here is yet another link between Mormonism and science.

4. Both science and Mormonism depend on theories in much the same way. Science may call these models, while the gospel calls them plans (e.g., plan of happiness, plan of salvation¹⁵), but both give the overriding structure within which individual experiences are processed and understood. Some models are better than others. Just as modern scientific models are much more developed, more sophisticated, and more consistent with much more finely observed data than were earlier world views, the Mormon plan of salvation is



*Orrery, Made by Newton and Company
London, early 19th century*

also more specific, more informed, and makes more use of more detailed sources of revelation than were earlier religious views.

5. Fundamental to Mormonism is the LDS experience with continuous revelation, and perhaps uniquely so. We believe that God “will yet reveal many great and important things” (Articles of Faith 1:9). Science, likewise, is always in pursuit of further light and knowledge. If science had all the answers, it would largely be out of business. What would it still be looking for? By the same token, I suppose, any religion that *thinks* it has all the answers — as in a closed canon — probably *ought* to be out of business. Identifying problems in the old and bringing in solutions that are new are what scientific and religious revolutions are all about, but such changes come not without resistance.

Thomas Kuhn’s classic description of scientific revolutions has its parallels here: He speaks of normal science as puzzle-solving in the face of anomaly (Mormonism began when Joseph Smith sought to solve a puzzle littered with anomalies). Kuhn describes the crisis and resistance produced by the emergence of new scientific theories (compare the crises that arose as Joseph Smith advanced a whole new world view through the plan of salvation).¹⁶ Kuhn articulates the ultimate resolution and success of scientific revolutions: “Probably the single most prevalent claim advanced by the proponents of a new paradigm is that they can solve the problems that have led the old one to a crisis.”¹⁷ In the religious sphere, we have Joseph Smith solving the problems of how there can be a resurrection of the just and of the unjust or how it can be possible for all people to be exalted if baptism is the necessary gate through which all must enter. While these religious and scientific revolutions arise out of their separate domains, they have much in common structurally and functionally, and ultimately progress is made in both spheres through such revolutions.

6. All this leads to an important need for humility. Mormonism and science should share the willingness to admit tentativeness: to admit we do not know everything, to think of “dark matter” that tells us we may not know anything about 95% of the matter that fills the Universe, to speak of dimensions beyond our comprehension.¹⁸

In a compelling article on humility in science and philosophy, Duane Boyce gives an example of the overconfidence of Logical Positivism, headed by A.J. Ayer. In 1971, I experienced some of this overconfidence firsthand in one of Ayer’s seminars at Oxford: Chomping his big cigar, he snorted: “When we say, ‘Mary had a little lamb,’ how can we *know* that this doesn’t mean, ‘Mary ate a little mutton?’” His underlying point that day was: we do not and cannot know anything that we cannot verify empirically. But less than a decade later, as Boyce points out, A.J. Ayer had admitted, when asked about the main defects of the then nearly abandoned Logical Positivism: “The most important of the defects was that nearly all of it was false.”¹⁹ It is best not to overstate one’s case and to advance one’s findings with appropriate qualifications.

But it is not only in science that things change. Religion and even our understanding of scripture have changed as new discoveries are made about the meaning of scriptural words and literary structures (in English, Greek, or Hebrew), about their manuscripts (both ancient papyri and the original manuscript of the Book of Mormon), about sacred texts from Qumran, or ancient Near Eastern texts from Babylonia or Ugarit, unfolding to view new understandings of ancient world views, typologies, covenant patterns, and prophetic speech forms. Some of these discoveries, like scientific discoveries, confirm and reinforce old understandings and beliefs; other discoveries send us back to rethink our religious emphases and awarenesses. As modern laws and social circumstances change regarding all sorts of things in people's daily lives, one must always be humble in the face of challenges that will be met, one way or another, by continuing research and revelations. Mormons who are conditioned by King Benjamin's plea are already comfortable with the need to "believe in God; believe that he is, and that he created all things, both in heaven and in earth; ... believe that man doth not comprehend all the things which the Lord can comprehend" (Mosiah 4:9).

Metaphysical Principles Shared by Science and Mormonism

Moving on to the some of the metaphysical points ably discussed by Lester Allen,²⁰ we first note that science is driven to understand matter, while at the same time, matter also matters deeply to Mormonism. D&C 131:7–8 affirms, "There is no such thing as immaterial matter. all spirit is matter." This spirit-matter "more fine or pure," but it is still matter. D&C 93:33, "the elements are eternal."

As Parley P. Pratt emphasized, matter and spirit are of equal duration; both are self-existent. Matter as well as spirit is eternal, uncreated, self-existing. Thus, the *Encyclopedia of Mormonism* states: "In its unique LDS doctrine about matter, matter in all of its many forms, instead of occupying a subordinate role relative to philosophical paradigms, assumes a sovereign position, along with the principles and laws governing its properties and characteristics."²¹ Whatever else this unique Mormon doctrine may imply, Mormonism and science both deeply value matter. Mormonism does not begin with the common assumption that has long prevailed and created problems in most corners of Christendom, namely that matter is undesirable, degenerate, temporary, bad, and even evil. If so, why would God (or we as resurrected beings) want to have — or even be able to have — a material body?

Mormon physical principles recognize that matter may appear in various states, some more refined than others, the same stuff but in two different states. Tracy Hall was famous for his accomplishment of making synthetic diamonds out of graphite. Graphite and diamonds, after all, are nothing but carbon in two different states.²² I searched the Church's website to see if this very scientific detail had ever been used for spiritual instruction. I found that in the Primary 6 manual, Lesson 39, this scientific fact was used as an example to teach young children how the trials of Job could transform him from one kind of person into a person by living a higher law



Graphite and Diamonds

under extreme pressure.²³ Stephen Webb has noted that for Latter-day Saints, the distinction between natural and supernatural is “one of degree, not of kind.”²⁴

Along with this shared view of matter, Mormonism and Science also share an appreciation for space and time. “Scripture speaks of the place where God dwells.”²⁵ For classical theology, of course, this is anathema. Yet Stephen Webb, in concert with Karl Barth’s theology of God’s space and its Christological form, puts God back into space, with its accompanying aspects of personhood, embodiment, relationality, and cosmology. Webb, by the way, states that “traditional and creedal theologians today have more to learn from Mormonism than any other religious tradition today, and that the Mormon position on matter can be reasonably defended.”²⁶

Mormonism, like science, recognizes the reality of time. God exists in time, even if time is relatively different where he is. LDS scriptures speak of “the reckoning of the Lord’s time” (Abraham 3:9). Having God in time is an option not open to tradition Christian theologians, hence again creating another point of disconnect between science and religion in many minds.

As J. Ward Moody has concluded, from an LDS perspective, “The big bang may have marked a beginning of time for our universe and was likely a momentous event of eternal significance. But it was not the beginning of God nor of existence [or of time] itself.”²⁷

The concept of the eternal nature of time, which accompanies the eternal nature of matter, serves LDS well in many ways.

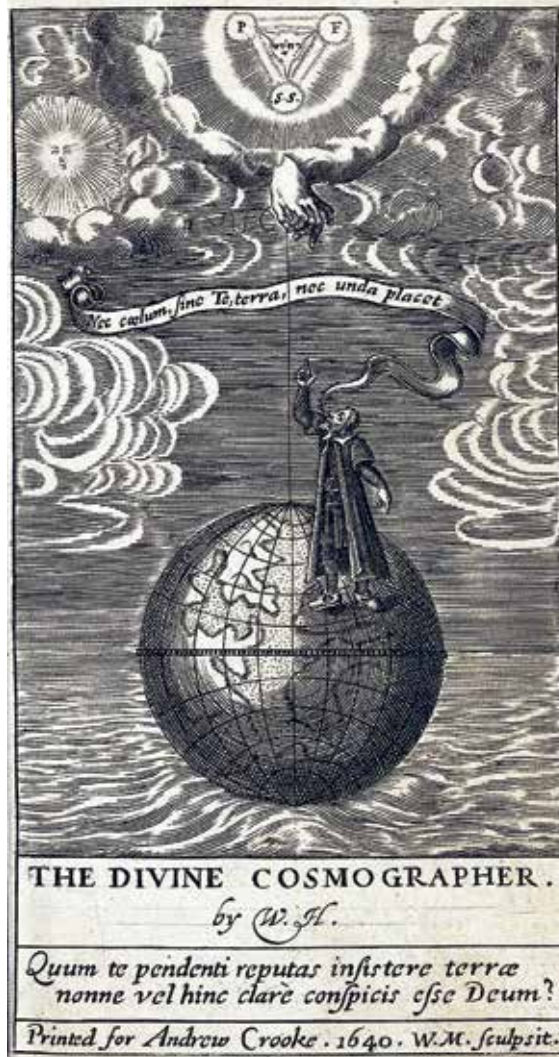
Concerning mercy, for example, Alma 42:4 brilliantly resolves the otherwise stalemating conflict between justice and mercy by recognizing that because God too exists in time, mercy can operate fundamentally within temporal sequences and progressions. A just and righteous God could, and would, punish us instantly as soon

as one had sinned, but mercifully God has granted unto man time to repent, “yea, a probationary time, a time to repent and serve God,” and thus “God might be a perfect, just God, and a merciful God also” (Alma 42:15). It is in this postponement of the execution of a judgment that mercy is to be found. This concept of mercy is logically unavailable to traditional Christians who see God, essentially, outside of time.

And what about cosmology and cosmogony? Much has been said about the Mormon understanding of creation as a process of organization, not creation ex nihilo. Joseph Smith said, “create ... does not mean to create out of nothing; it means to organize; ... God had materials to organize the world out of chaos — chaotic matter, which is element.”²⁸

And indeed, it has been recognized, not only by LDS scholars²⁹ but also recently by Christian and Jewish scholars³⁰ that the doctrine of ex nihilo creation was a relatively late development in Christian history, not present in the Bible. For example, Jon Levenson notes that we should best interpret Genesis 1:1 as a temporal clause: “When God began to create the heaven and the earth,” not suggesting an absolute beginning and that “formless and void” should best be translated as “primordial chaos.”³¹ Open Evangelical theologians are even saying, that the “deep” in Genesis 1:2 “refers to something nondivine and primordially present when God began to create” and were “uncreated.”

Thus, whatever problems are created between science and religion over Genesis 1:1 may be due in large part to a problematic reading of Genesis 1:1 to begin with. Indeed, the understanding of the creation posited by advocates of open theology is also used to explain the continued existence of evil and the reality of Satan in the world, which has the advantage of breathing important life into the reality of the miracles performed by Jesus, many of which counteracted the natural presence of evil in the world. Seeing the natural history of this world as a kind of cosmic warfare, as Gregory Boyd has suggested, allows us to see the evolutionary



The Divine Cosmographer, 1640
William Hodson, active 1625-1640

process “simply as the first stage of the battle we find being waged throughout human history,” namely “the battle that culminated in Christ’s life, death and resurrection.”³²

Mormonism likewise affirms the reality of Satan and the forces of evil and therefore sees the creation process as a continuing event still going on today, not a single instantaneous event of the past. In this ongoing organization, Mormonism sees the uniting powers of God’s infinite (and therefore perpetual) at-one-ing [atoning] powers as staving off entropy (that would otherwise occur in a closed system), corruption, chaos, and disorder. God is still involved with this “earth” by lending us breath from day to day and supporting us “from one moment to another,” according to King Benjamin (Mosiah 2:21). Perhaps one will never be able to prove empirically that God is sustaining the world, but it is not unattractive to believe that something is holding this delicately balanced and orchestrated world together. Perhaps we do not see this simply because such things only “be discerned by purer eyes; [which] ... when our bodies are purified we shall see” (D&C 131:7-8).

Of course, science can describe what is happening in the world without necessarily making any reference to God, let alone making any claim to being able to give a complete description of all that is happening in the world, just as a docent in an art gallery can describe a painting without necessarily making any reference to the artist who painted it. You do not need God to do science, but think how much more you know about a painting by knowing about the artist and why he or she has painted it.

Mormonism and science both see the world as fundamentally pluralistic. As I and others have said, “LDS thought clearly emphasizes the importance of the fundamental plurality of the world.”³³ I think that Mormonism dynamically thrives over and over; the Mormon world view relishes multiplicity. Words found traditionally in only the singular are boldly spoken of as plurals in Mormon doctrine: We speak of priesthoods, intelligences, noble and great ones, two creations, worlds without number, continuing revelations, scriptures, covenants, degrees of glory, eternal lives, saviors on Mt. Zion, and even gods. Significantly, the universe even houses a manifold of laws! Joseph Smith spoke of many kingdoms and that “unto every kingdom is given [its own] law,” and “all truth is independent in that sphere in which God has placed it” (D&C 88:38, 93:30). To me, such statements of cosmological plurality unleash and transfigure the concepts of natural law. Traditional Christian theology, however, is essentially monistic, for everything was created by one God, in one stroke, and in one perfect state, a position one theological scholar, Clark Pinnock, has rejected as non-biblical,³⁴ principally in an effort to allow room for both the biblical and modern scientific views of things.

Mormonism sees great significance in the binary nature of the world. Light and dark, wet and dry, heaven and earth, hot and cold, plant and animal, animal and man, male and female, positive and negative ions, positive and negative magnetic poles, matter and antimatter, l-amino acids and d-amino acids,³⁵ active and passive,

and things to act and be acted upon. Things come in twos, even a double helix at the core of living cells. As Lehi famously said, “There needs must be an opposition in all things” (2 Nephi 2:11). Without opposition, choice would be illusory, purposeless, pointless, and impossible. The quite miraculously uniform fundamental moral and physical nature of this world is to be found in these opposites. For both Mormonism and science, this world is in tension, it is not static, it is not yet completed, but it is still unfolding, and “the unfinished and future-oriented aspect of things provides the basis for growth and improvement, even evolution.”³⁶

Any discussion of creation and cosmology invites some comment about evolution, and it might be worth making yet again the point that it is just as important to read the scriptures carefully and correctly as it is to insist that science be done rigorously and cautiously. Many questions still remain on both sides. I was impressed by a point made by Duane Boyce that in Mormon 9:11, Moroni asks: “Who shall say that it was not a miracle that by his word the heaven and the earth should be; and by the power of his word man was created of the dust of the earth?” Boyce argues from this scripture that these two creative acts were performed as miracles (marvelous events) by God, and therefore there is scriptural support that they did not come about through undirected evolutionary processes governed by mere chance.³⁷ But what one might well ask is this: Does this leave room for the intervening events in the creative periods regarding plants and animals to have unfolded by some evolutionary process? It is important to note that scripture does not preclude such a possibility.

More could be said about Mormonism’s strongly preferring completeness over consistency as do modern science and math. For example, I am fascinated by the implications of Gödel’s 1931 incompleteness theorem, which demonstrates that a



Austrian Logician, Mathematician and Philosopher, Kurt Friedrich Gödel, 1906-1978

system can be either complete or consistent but not both.³⁸ Gödel’s work as a young mathematician at the University of Vienna successfully proved the “axiomatic” approach to mathematical thought as unsound. The original proofs of Gödel attacked the ancient Greek approach to mathematics, which accepts as true certain unproven

axioms and derives from those axioms all other propositions as theorems.³⁹ This approach was successfully used in geometry and in Gödel's time was applied to other forms of mathematics. Gödel's proof, however, showed that approach to be unsound, and his theories have since been extended beyond mathematics to other disciplines, including philosophy and systematic theology. Thus, systematic theologies or rational philosophies may well be internally consistent but at the expense of completeness. Sets and abstractions may be helpful, but they are simply extractions of selected elements of otherwise messy realities. Mormon thought, in contrast, privileges fullness, abundance, completeness, and all that the Father has, even if that means Mormon life becomes joyously overloaded or torn by competing pressures that pull, stretch, and expand us in many ways. This may produce episodes of cognitive dissonance, social quandaries, mystery, and uncertainty, but if forced to choose, Mormon thought will always prefer openness over closedness, boldly inviting further growth, progression, and, fortunately for us in academia, further questions. For this reason, we choose to live with conflicts between religion and science rather than settle for half a loaf.

In contrast, "naturalistic determinists — like theological determinists — seek to have a completely contained universe. In this universe ... the cosmos unfolds with logical and ontological predictability."⁴⁰ But, as Craig Boyd argues, "The naturalistic determinism narrative ... is as much a myth as the Christian myth of the creation's original perfection." He cites the Heisenberg Uncertainty Principle and Gödel's Theorem as key reasons why "theists have strong reasons for believing that the universe is not a self-contained system."⁴¹ Mormons couldn't agree more.

The standard objections to Aquinas' naturalism, Kant's idealism, or Hart's positivism is that they exclude too much of the picture of life, saying more and more about less and less, until they say virtually everything about nothing. Abstractions may be clean and clear, but they are also just that, extractions of selected parts from an unmanageable and perhaps naturally inconsistent whole. The answer is not to say less and less about more and more until one is left to say nothing about everything. Seeing reality as in many ways rationally unprovable may yield periods of unknowability, but here too Mormonism boldly recognizes that there must be an opposition in all things (see 2 Nephi 2:11), including rationality and irrationality, as paradoxical as that may seem.⁴²

For this very reason, Joseph Smith objected to the limiting effects of denominational creeds, rational and consistent though they may be: "I want to come up into the presence of God, and learn all things: but the creeds set up stakes, and say, 'Hitherto shalt thou come, and no further.'"⁴³ In the LDS context, from the beginning, one even wants to keep all the commandments, even if some of those commandments appear to contradict others.

In other words, this world is messy. It is not perfect. It may be ordered in certain ways, but even within its order there remain important pockets of chaos and unpredictability.

Open Theologian Keith Ward speaks of the “huge ontological gap” that “exists between any and all models and the complex, fuzzy, dynamic and opaque real world.”⁴⁴ Thus, science and Mormonism, now joined by open theologians, acknowledge and even privilege complexity over simplicity. Occam’s Razor made sense in the medieval worldview, which viewed everything as quite simple, and therefore the simplest explanation was always to be deemed the best. But since the world is complicated, it will take something very complicated to begin to represent it adequately.

Among the most significant of points that could be underscored is our acceptance of a fundamental axiom that human nature is changeable, both for better or worse: “And again, verily I say unto you, that which is governed by law is also preserved by law and perfected and sanctified by the same. That which breaketh the law, and abideth not by law, but seeketh to become a law unto itself, and willeth to abide in sin, and altogether abideth in sin, cannot be sanctified by law, neither by mercy, justice, nor judgment” (D&C 88:34–35).

Other metaphysical and cosmological concepts could be similarly aligned, such as cause and effect, consequences, order, predictability, opposite and equal reactions, causation, determinism, and freedom. But I hope the points I have covered are sufficient as a starting point for further exploration.

In sum, Mormons do not approach the world as do dogmatic secularists, strict realists, or scientific determinists — all of whom make no room for God in this world. With them Mormons agree that laws are important and that regularity and order are necessary for choice. But laws cannot explain everything.

Neither do Mormons approach the world like the religionists, who as strict idealists, monists, and religious determinists or predestinationists, make or see no room for science in God’s world. With them we agree that God created the plan, has laid down the “determinate counsel” (Acts 2:23), and will honor every agreement he made. But under the plan adopted in that premortal determining council, God relates to other beings, animate and inanimate.

Mormons find some things in common with natural law theologians. Yet their proposed solution is that there is only one law, if we only knew it, while Mormonism sees one law in each kingdom: “All kingdoms have a law given; and there are many kingdoms, ... and unto every kingdom is given a law” (D&C 88:37–38).

Ideas Shared by Open Theology and Mormonism

Mormonism might find a strong discussion partner in Openness theology. I have already mentioned the work of Keith Ward. I also recommend the two books edited by Thomas Oord, and William Hasker.⁴⁵ What do these Open Theologians believe, and why should their efforts be of interest to LDS?

- They say: There were divine or preexisting things that God did *not* create: We likewise say God organized co-existing matter.



Artwork Depicting Star Formation

- They do not find any place in the Bible that says God created *everything*. In fact, they find in Genesis 1:2, the presence of matter unorganized, without form, which the Hebrew can be translated to read “chaos.” There was chaos. There is the deep, also, which is not a part of the dry land and the world which is created by God, according to their reading of Genesis 1 and indeed according to Joseph Smith’s reading.
- They say: Humans are genuinely free to make choices [not predestined]: We agree.
- They say: God experiences others in some way analogous to how we experience each other: i.e. that we are in some ways like him, and he is in important ways like us.
- They see God as changeable: our prayers can change his mind.
- They see God as relational, completely committed to helping his children in the best possible ways. So do we: “For this is my work and my glory” (Moses 1:39).
- They say: God takes calculated risks because God is not all-controlling. He even shares with other beings the ongoing process of creation. We agree that God is willing to allow us to fail, although it gives him great sorrow.
- They say: God’s *experience* changes, yet his nature or essence is unchanging. We agree that God is still in some sense progressing.

- They say: we do not know everything and that the future is still, in important senses open, not predestined.⁴⁶ We couldn't agree more. Now, they do not think of an open canon — they do not go quite that far. But the idea of open revelation can't be far away from their basic approach to theology.

Notice how far these open theologians have departed from traditional Christian theology and how they have taken positions based on their reading of the Bible alone that are close to LDS understandings. More than that, notice how their theology changes the fundamentals of the debates over the existence of Satan and evil and chaos in this world, even today, as the conflict with evil is still ongoing. It changes the debates over the Heisenberg Uncertainty Principle and its implications for opening up our understanding of divine foreknowledge, or naturalistic determinism, and human free will, or for God's drawing (and I quote from them): "humans and other personal agents into the process of world-making."⁴⁷

I do not mention this new development because I think open theologians have it all figured out but rather to illustrate an important point: that not all theologies are created equal. Some are more "science friendly" than others. In other words, some theologies have what I would call a higher "Sci-Q" or "science quotient" than others. I find that the open theology and Latter-day Saint doctrines both have very high Sci-Qs, making potentially strong discussion partners as well as potential allies with much of science.



Toward a Friendly Alliance Between Science and Religion

Finally, I wish to say a little about how these alignments might serve as lynchpins in forging a friendly alliance between science and religion. In this world we need all the friends we can get. Alliances are desirable if carefully negotiated. Religion and science can learn much from the worlds of law, alternative dispute resolution, and international treaty formation. As Mormon statesman J. Reuben Clark said, one must avoid the hazards of alliances being used inappropriately, especially if it

might require a party to behave in a manner that contradicts its basic standards and beliefs.⁴⁸

Overall, forming alliances, partnerships, and marriages is generally a very good thing. As Steven R. Covey says, “In every conflict of two opposing alternatives, there is always a third.” He calls that third alternative, synergy. “Synergy is what happens when the whole is greater than the sums of the parts.”⁴⁹ “In a compromise, $1 + 1 = 1\frac{1}{2}$. In other words, everybody loses something. Both sides make concessions, neither side is truly satisfied, and the conflict is just postponed.” When you get to synergy, however, energy is created rather than lost. In this case, $1 + 1 = 2\frac{1}{2}$. The first step in getting to synergy is the willingness “to put aside your position long enough to understand the other side”⁵⁰ and to realize that the more you differ, the more both sides can learn from the other’s perspective.

In the quest for truth in the best of all worlds, as Robert L. Millet has sensitively written from the voice of deep, genuine experience, “If my Latter-day Saint colleagues and I can enjoy such a sweet brotherhood and sisterhood with a growing number of Evangelical Christians, ... then surely it is possible for men and women of faith who labor in varying avenues of science to enjoy cordial and collegial relationships with those involved in the study and teaching of religion.”⁵¹ He goes on: “Our epistemological thrusts may be different. Our predispositions may be different. Our tests of validity and reliability may be different, but our hearts can be united as we strive to look beyond the dimensions of our disciplines towards higher goals.”⁵²

Against the strong currents of moment, BYU and Latter-day Saints have many opportunities to contribute to this alliance, precisely because they care so deeply about both. In building bridges, in any kind of alliance or partnership, it is important to emphasize and build upon similarities and commonalities rather than to focus too rigidly or exclusively on the differences.

Forming alliances can be tricky and risky. In some periods of American history, politicians have shunned any forms of treaties, viewing all of them to be entangling alliances, and for this reason people rightly think long and hard before entering into any treaty, alliance, or partnership, internationally or legally, as J. Reuben Clark rightly and frequently cautioned. For example, he opposed any alliance that sought to accomplish big power domination of small states.⁵³ There have been times when treaties and alliances were not very useful to various countries, but from times as early as the ancient Near East, empires were built and operated on the basis of treaties and covenants that were not only useful but in many cases necessary.⁵⁴ Nations far apart from each other with little or no interaction with each other may not need a treaty, but countries or academic institutions sharing long and disputed borders have little choice but to enter into some kind of carefully constructed and operated treaty for their mutual benefit and not the dominance of either one over the other.

A research group in the United Kingdom, Alliance Best Practice (ABP), helps its clients generate more value from their strategic alliance relationships through the discovery, dissemination, and delivery of their “best practices” guidelines. The organization offers a database of over 130,000 observations of “alliance best practices in action” generated from examining in depth over 300 companies. In a set of 52 guidelines, ABP asks its clients such things as whether or not they have identified the business value of the relationship, have conducted due diligence before entering an alliance, have spelled out an optimum structure for the relationship, and have articulated common and for the relationship.⁵⁵ I am not suggesting this exact kind of strategic alliance procedure, which works in an international setting, could be naively transferred over and used automatically in handling relations between religion and science, but it does seem to me that building a strong and successful alliance between scientists and religionists won’t happen if the parties simply hope a good alliance will emerge *ex nihilo* or somehow in a big bang. Good relationships require conscious formation and deliberate development.

How might an alliance between science and religion then be negotiated and structured? First, nations most often commit themselves to fight alongside each other because of shared values and ideals. Having a common enemy or common objectives is essential to any alliance. Even though science and religion may agree on some important issues, many pressing current issues could be identified to bring them into closer cooperation. Even though the British and the Americans once fought each other, and even though the French and the Americans speak different languages and have different legal systems, current issues regarding international security and world trade bring these allies tightly together. Is it too much to imagine science and religion finding ways to make progress together regarding global warming and environmental issues that affect future generations, in better understanding issues of understanding human life, the correction of criminal behavior, and resolving health care debates that leave everyone in today’s world baffled? What about the need just for greater appreciation and amazement concerning the world around us, to overcome boredom, and to increase the enjoyment of the world around us?

In addition to having a common ideal or objective, allies need to realistically offer benefits to each other, especially benefits or abilities that the other partner lacks. Here also, it seems to me that there are important ways in which science and religion do fundamentally different things, both of which are crucially needed for the other. In particular, science is much more interested in and in many ways limited to making observations of past events, whether tests run in the laboratory a few hours ago or geological fossils deposited eons ago. Religion, on the other hand is more concerned about the future, what will happen in the world to come, and how should people live today to create a more righteous and attractive world? Science is descriptive, whereas religion is prescriptive. Science is more interested in mechanisms (when, where, and what has happened), whereas religion is more interested with relationships (who has been involved, how, and why). Science is typically quantitative, and religion qualitative. Philosophy has argued persuasively

that it is impossible to derive an *ought* from an *is*.⁵⁶ No matter how much a person knows, that knowledge does not create a moral obligation. People may know that smoking causes lung cancer, but that fact does not create a moral obligation not to smoke. Science can tell people how to do something and why a mechanism works, but religion gives people guidance and spiritual access to authoritative revelation, personal inspiration, and prayer to determine what one should do, including the manner and purpose for which it should be done. The more that science and religion recognize the strengths the other can bring to the table, the more likely they will be to form friendly and constructive alliances.

LDS scientist Richard Haglund has written about the common interests of science and religion in preserving moral and intellectual freedom, necessary for both for the scientific and religion communities, and about “the need of science for periodic infusions of categories and concepts not available in its own storehouse — a need which has frequently been met by theological, religious or mystical perceptions of the universe.”⁵⁷ Science also “offer[s] to religion a valuable example of the continual interplay of creative doubt with an abiding faith in the basic orderliness of the universe.” What so cripples science, Haglund continues, is its tendency towards idolatry — that is, towards the treatment of some sort of collective set of representations as if it were itself the sub-sensible basis of the phenomenal world. Religion can be of use in curing



this problem. What cripples religion is pride. Science, with its constant reminder of the limits of our knowledge, can help cure pride.⁵⁸

And in other ways, Henry Eyring speaks of many things with which science enhances religion. For example, helping to “sift the grain of truth from the chaff of imagined fable” and by quantum mechanics countering mechanical determinism.⁵⁹

In any event, we cannot count all the ways in which religion and science may help each other. This remains to be explored. “But it must be based on a steadfast refusal to gloss the apparently inevitable points of difference between disciplines, and a determination to treat conflicts as opportunities for a union in diversity, rather than as challenges to do battle over contested territory of thought.”⁶⁰

And finally, it is important to think how good allies treat each other, much as how loving spouses treat each other. According to the best alliance findings:

- Good allies make allowance for differences.
- They think more often about “us” and less often about “me.”

- They think about doing things together with an inclusive “both” and an “and” rather than an “either/or.”
- Good allies have an absolute commitment to their ideals, and yet they realize their relationship is a work in progress and serves to meet new challenges as they may arise.
- Good allies are not dogmatic or intransigent but wish to gather knowledge and humbly listen to the needs of the other. Respect and tolerance are crucial, even though these virtues have not characterized most struggles between scientists and religionists since the beginning of modernity.
- One ally does not diminish the other. Much has been said about science as the weaker ally and the spirit, the better. While that may be true enough, let the head not say to the foot, I have little need of you. Let the stronger ally never say to the weaker, you are less important at what you do. What’s to be gained by that? As B.H. Roberts said, both may be of first-rate importance.⁶¹
- Good allies do not intentionally harm one another but rather look out for each other’s interests and help each other by supplying information and giving constructive criticisms to each other.
- They ask each other helpful questions and press the other to address hard issues. For example, might not either side ask:

Did the Nephites really know about the rotation of the earth around the sun? David Grandy has recently analyzed Helaman 12:15 as saying something different.⁶²

Have scientific researchers reported their findings completely and accurately?

Have creationists failed to consider what the word *state* might mean in 2 Nephi 2:22, and might it mean that Adam and Eve would have simply remained in the “state of innocence,” as their state is called a verse later, and what might Lehi have meant by that? These are helpful questions that may encourage working partners to look harder at things both sides may have taken for granted, things they have overlooked, to assumptions that may not be working so well.

- With full information, friendly allies allow each other the latitude of making independent decisions, and they give each other the benefit of the doubt if arguments arise or if decisions are made that seem to go against the interests of the alliance.
- If a decision by one ally turns out to be wrong, especially if it causes harm to the other, allies fix their mistakes and try to compensate for the

harm done to the consortium. Competence, after all, is what you do after a mistake.

Obviously the political machinery for proposing and negotiating alliances does not exist in the world of science and religion, but this does not mean channels of communication cannot be opened in this regard. *Zygon, Journal of Science and Religion*⁶³ is a good example. Professional associations such as the American Academy of Religion and other such organizations must have sections that coordinate and sponsor academic conferences and publications on science and religion questions.

I believe that whatever the historical causes of war between science and religion, whatever the mythological or ideological decision of history in this regard that may have occurred,⁶⁴ we should advocate peace between science and religion. We should be peacemakers. Meaningful accommodations have already successfully been made. Significant progress has been accomplished in recent decades. Noticing the positives will allow us to bury old hatchets and get to “yes” rather than “no.” We have all come a long way since the Inquisition, and science has no need to fear any longer for its continued existence and vitality. One might even argue that science is more likely to find greater acceptance and that scientists will find more willing populations to apply their results if they have respectfully thought through and ameliorated ways in which their work may negatively impact religious predilections and sincerely held values.

I am not sure who is behind perpetuating this conflict any longer, what their objectives and interests might be, but I cannot image this war must or should go on indefinitely, any more than any other war. One hopes the old days of imperialism are gone, and one can also hope the competition for dominance between science and religion will also be felt to be incompatible with a world that values open discussion, the market place of ideas, and especially the promotion of the best in all things. Although in this marketplace one must also guard against the democratic evils of the tyranny of any majority and be aware of the fact that sometimes the best ideas do not survive simply because they get shouted down or do not happen to be articulated or communicated as widely as their competition. But in any event, the objective of any protracted war between science and religion certainly should not be obliteration or annihilation of the opposing party. Neither should the objective be the construction of a Berlin Wall, let alone a Maginot Line⁶⁵ between the two. Science and religion were once married, and that marriage has run into troubled times. But just because an alliance or a marriage runs into disagreements doesn't mean that we must or should call the whole thing off and descend into all-out hostility, separation, and costly divorce.

Promising Years Ahead

In conclusion, there is still much work to do, but I see very promising years ahead. Mormon metaphysics and LDS religious fullness seem to me to offer new ways of thinking about traditional problems in the science and religion debate. The Mormon

way of thinking may raise unique issues of its own, but they are not the traditional problems that have stood behind the science and religion stalemates. We can move beyond those blockades. There will always be worldly things that will make it difficult to be a Latter-day Saint by making some Mormon beliefs objectionable, frustrating, or awkward. We won't always have all the answers to all these difficulties, certainly not the moment they first arise. But our ongoing task as Latter-day Saints is to build bridges and to lay ourselves down as a bridge over troubled waters, even if that means we get shot at from people on both ends of the bridge. Our mandate is to embrace these challenges constructively and to develop objective defensible answers that are also consistent with our scriptures, doctrines, and spiritual knowledge.

Just as Latter-day Saints are likely to see *work* differently from the world — because we know that God himself has a work, and it is his glory, and that faith without works is dead (Moses 1:39; James 2:26); and just as we see *ethics* quite differently — because, for us, humans are not disconnected creatures with whom we selectively enter into social contracts, but all are related to us as members of our premortal family; and just as we see *power* differently — because we take seriously the scriptural curse placed on anyone who misuses power for glory or gain, and we know that the greatest must be the servants of all (see D&C 121:36–39; Matthew 23:11), so we are bound and blessed to see science differently, because we come at our science and at our religion equipped with a difference set of assumptions about fundamental, metaphysical axioms. At Brigham Young University we have the constant opportunity to bring these Mormon insights to bear on all kinds of scholarly and scientific topics and at the same time to bring scholarly and scientific perspectives to bear on religious and spiritual topics of importance to Latter-day Saints. If we think there isn't a Mormon point of view on any subject, it may well be that we haven't yet looked and stretched high or deep or wide enough.⁶⁶ To this end, there is much work yet to be done in forging and strengthening the strong, productive, and friendly LDS alliance between science and religion.

We need to keep up with new developments both in science and in religious discussions. Blithely regurgitating conclusive statements that were popular forty or eighty years ago is annoying, to say the least. As Henry Eyring has said, “We run grave risks ... if we teach our pupils some outmoded and nonessential notions. ... Do not defend a good cause with bad arguments.”⁶⁷ Dallin H. Oaks reinforces this statement: “A bad argument is worse than no argument at all.”⁶⁸ Imprecise statements about “true science” and “true religion” need to be avoided, as we strive to make ourselves better understood, especially in our classes and among our academic peers.

It is a joy to be at BYU at this moment in the intellectual history of the Latter-day Saints as a people. I am deeply grateful for the unabashed amazement that my BYU professors in the 1960s exuded as they taught me the wonders of biospheres and ecosystems and the sophisticated elegance of mathematical proofs. After all that can and has been said, I find science to be a work of art and beauty. I like it when we think about the creation of this world and pronounce it not just “good,” but “beautiful” (*kala*, LXX Genesis 1:31).



Left: *Ezra Taft Benson Building, home of the BYU Department of Chemistry and Biochemistry;*
Right: *Joseph Smith Building, home of the BYU College of Religious Education*

I really believe in the fullness of the gospel and the openness of science and knowledge. I have tried to embrace all truth in one great whole and go in as many constructive directions as I can.

Our eternal purposes all lead us to Christ. He is the only truth (John 14:6) who will make us free (John 8:32), even if we can only approach him as a limit. I testify that he lives; he who marked the path and shows the way of life and that “the preeminent manifestation of the eternal nature of both physical and spiritual matter is found in the eternal existence of God and ultimately his human children as discrete, indestructible entities.”⁶⁹

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Endnotes

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He is well known as the founder of FARMS (the Foundation for Ancient Research and Mormon Studies), and since 1991, as the editor-in-chief of *BYU Studies Quarterly*, the leading interdisciplinary journal at BYU. He also has served as the general editor of the *Collected Works of Hugh Nibley*, as a member of the Jewish Law Association, and on the board of editors for Macmillan's *Encyclopedia of Mormonism*. He was the Distinguished Faculty Lecturer at BYU in 2010.

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He is married to Jeannie Sutton, who recently retired from the French Department at Brigham Young University. They have four children and seventeen grandchildren. Together they enjoy traveling, teaching, family activities, the arts, and church service in ward, stake, and temple capacities.