

INTERPRETER



A JOURNAL OF LATTER-DAY SAINT
FAITH AND SCHOLARSHIP

Volume 39 · 2020 · Pages 1 - 40

Temporal Mercies and Eternal Being: Using the Science of Time to Understand God's Nature and Our Own

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Offprint Series

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ISSN 2372-1227 (print)
ISSN 2372-126X (online)

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TEMPORAL MERCIES AND ETERNAL BEING: USING THE SCIENCE OF TIME TO UNDERSTAND GOD’S NATURE AND OUR OWN

Jared R. Stenson

Abstract: *How does God relate to time? How do we? Modern science and revelation offer distinctive and fascinating perspectives to these questions. Specifically, the physical mechanisms underlying time have doctrinal parallels, they appear to be operative at the Fall, and they correlate with several phenomena that make God’s mercy possible.*

Time is clearly not our natural dimension ... Whereas the bird is at home in the air, we are clearly not at home in time — because we belong to eternity! Time, as much as any one thing, whispers to us that we are strangers here. – Elder Neal A. Maxwell¹

People like us, who believe in physics, know that the distinction between past, present, and future is only a stubbornly persistent illusion. – Albert Einstein²

Questions about time arise as soon as you begin reading the standard works. From the very first sentence, “In the beginning, God created the heaven and the earth” (Gen 1:1), we may ask, what is this beginning? If it was the moment of this earth’s creation, how could the “evening and the morning” be called the “first day” if the bodies by which “days” are defined, wouldn’t even be organized for four days (see Moses 2:14–19)? If, instead, this beginning refers to the singular event of the Big Bang,

1. Neal A. Maxwell, “Patience,” *Ensign* 10, no. 10 (Oct 1980).

2. Taken from a letter of condolence sent to the family of Einstein’s recently deceased friend Michele Angelo Besso in 1955, as quoted in Freeman Dyson, *Disturbing the Universe* (New York: Basic Books, 1979), 193.

which is presumed to have created not only the universe but time itself, can it have a cause? Can causality — and with it, law, rationality, truth, or freewill — exist apart from time? And if these did have a beginning, must they have an end?³

Should these questions be settled, deeper theological ones appear. Specifically, how does God relate to time? The traditional view sees him as “infinite and eternal, from everlasting to everlasting ... unchangeable” (D&C 20:17); “self-existent”;⁴ and without even a “shadow of changing” (Mormon 9:9–10). His power is “without beginning of days or end of years” (D&C 84:17) and is dispensed according to his “foreknowledge of all things” (Alma 13:7–9). Yet almost in flat contradiction to this, we are told that God’s power is also wielded by faith,⁵ which Alma defines as “*not* to have a perfect knowledge of things” (Alma 32:21). Not only does this incompleteness require the temporalizing virtue of patience (see Ether 12:6), it lays bare the curious tension implied in God’s aim to “to bring to pass” our “eternal life,” as if *constancy* is founded on fundamental *change* (see Moses 1:39, Mosiah 27:25–26). But how can we ever truly *become* like him if it is not in his nature to *become* anything, but to always *be*? Moreover, why would an eternal God admit concepts like “beginning,” “before,” “after,” “patience,” “change,” “becoming,” or even “faith” or “agency,” if these very terms suggest realities that are contrary to his *eternal* nature? The fact is, God’s purposes are only meaningful if the reality of change is admitted, but his power is only reliable if it is undeviating. The idea that organizes these questions of divine dynamics into a clear narrative is time.

Discussions of time and timelessness — whether in nature, in God, or in ourselves — inevitably lead to confusion. Infinite regresses, singularities, and

3. In the King Follett sermon, Joseph Smith raised this curious logic in regard to eternal being: “I take my ring from my finger and liken it unto the mind of man — the immortal part, because it has no beginning. Suppose you cut it in two; then it has a beginning and an end; but join it again, and it continues one eternal round. So with the spirit of man ... As the Lord liveth, if it had a beginning, it will have an end.” The Prophet calls this “good logic,” despite displaying less certainty earlier, saying, “That which has a beginning *may* have an end.” Joseph Smith, *Teachings of the Prophet Joseph Smith*, ed. Joseph Fielding Smith (Salt Lake City: Deseret Book, 1976), 353–54, emphasis added. This prophetic vacillation between a finite and endless experience, especially as it relates to our identity, illustrates the tension explored in this paper.

4. Smith, *Teachings*, 352.

5. Joseph Smith, *Lectures on Faith*, (American Fork, UT: Covenant Communications, 2000), 1:13–16. See also Heb. 11:1–3.

paradoxes arise; the terms used are ill-defined; and we clearly have a bias — like a fish to water, we are *in* time, we breathe it. This has not stopped philosophers, scientists, and theologians from discussing it, however. Aristotle’s formal relation of time to motion and change⁶ was largely carried forward in Newton’s somewhat intuitive formalization of “absolute, true, and mathematical time, of itself, and from its own nature, flow[ing] equably without relation to anything external” toward the future.⁷ Similarly, Augustine’s 4th century elaboration of Greek notions laid the foundation for what has become the traditional Christian intuition regarding divine timelessness.⁸

Recently, a parallel expansion of both scientific and philosophic time has reoccurred. Modern physics presents an unexpected picture of time at both the cosmological and microscopic scales. In the former, time is a dimension that combines almost indistinguishably with space to form a larger whole called spacetime. Rather unexpectedly, however, this spacetime stage on which events occur dynamically responds to the energy, motion, and light of the actors within it. In the latter, time’s flow, if it exists at all, can be viewed as an emergent property of microscopic systems that are themselves potentially timeless.⁹ At the same time, some philosophers have advanced a view of God as genuinely collaborative and responsive.¹⁰ Contrary to the traditional

6. Aristotle, *Physics*, trans. R. P. Hardie and R. K. Gaye (MIT Classics Online) Chapter 4, parts 10–13, <http://classics.mit.edu/Aristotle/physics.4.iv.html>. Even before Aristotle, Heraclitus, and Parmenides famously began the discussion by disagreeing as to whether reality was fundamentally static or dynamic.

7. From Newton’s *Principia*, quoted in Jeffery C. Leon, *Science and Philosophy in the West* (Upper Saddle River, NJ: Prentice Hall, 1999), 73.

8. Augustine, *Confessions*, Book XI, <http://www.sacred-texts.com/chr/augconf/aug11.htm>.

9. While physicists interpret the facts differently, many agree that there is a “problem of time” to be addressed. Julian Barbour argues the Parmenidean view that reality is fundamentally timeless in *The End of Time: The Next Revolution in Our Understanding of the Universe* (London: Weidenfeld & Nicolson, 1999). See also Craig Callender, “Is Time an Illusion?” *Scientific American* 302, (June 2010): 58–65. Lee Smolin, on the other hand, makes a case for the fundamental reality of time in *Time Reborn* (Boston: Houghton Mifflin Harcourt, 2013) as does Tim Maudlin in “A Defense of the Reality of Time,” interview by George Musser, *Quanta Magazine* (May 16, 2017), <https://www.quantamagazine.org/a-defense-of-the-reality-of-time-20170516/>. For fairly objective, accessible, and comprehensive treatments of the physics of time see Sean Carroll, *From Eternity to Here: The Quest for the Ultimate Theory of Time* (New York: Dutton, 2010) or Paul Davies, *About Time: Einstein’s Unfinished Revolution* (New York: Simon & Schuster, 1996).

10. See Douglas Browning and William T. Meyers, eds., *Philosophers of Process* (New York: Fordham University Press, 1998) for an introduction to this broader field of process thought. Clark Pinnock et. al. develop a milder version of this strain

static view, he is open to the uncertainty, tenuousness, and change inherent in the human temporal experience. This implicitly assumes God shares at least some aspects of our temporal nature, including the limitations it imposes. While many Latter-day Saint thinkers agree with this view, many have challenged it as well.¹¹

In either case, these questions take on particular import for Latter-day Saints for at least two reasons. First, Latter-day Saint doctrine asserts a material yet eternal God. Latter-day Saints therefore accept a special challenge to make sense of the dynamics of physical element in the context of supernatural truths — to reconcile spiritual realities with spacetime concepts. Second, Latter-day Saints take seriously the admonition to become like God, even seeing themselves as his literal offspring, sharing his divine nature and destiny. Joseph Smith taught, “If men do not comprehend the character of God [and this presumably includes his temporal nature], they do not comprehend themselves ... It is the first principle of the gospel to know for a certainty the character of

of thinking as it applies specifically to the narrower theological discussion in *The Openness of God: A Biblical Challenge to the Traditional Understanding of God* (Downers Grove: InterVarsity Press, 1994). For philosophical discussions outside the narrow field of openness or process thought see the definitive works of Huw Price and J.M.E. McTaggart (see footnote 16).

11. BYU professor Eugene England popularly professed a rather open view of God’s knowledge. See England, “Perfection and Progression: Two Complementary Ways to Talk About God,” *BYU Studies* 29, no.3 (1989), 31–47, <https://byustudies.byu.edu/content/perfection-and-progression-two-complementary-ways-talk-about-god>. Elder Bruce R. McConkie, on the other hand, famously listed this view (in an apparent response to England’s earlier articulation of his ideas in 1979) as the first of his seven deadly heresies. See McConkie, “The Seven Deadly Heresies,” Brigham Young University fireside, June 1, 1980, https://speeches.byu.edu/talks/bruce-r-mcconkie_seven-deadly-heresies/). Nonetheless, an open view of God is increasingly popular among Latter-day Saints. For instance, two decades after the England-McConkie exchange, Latter-day Saint philosophers David L. Paulsen and Matthew G. Fisher gave a review of Pinnock’s book, saying “This study of God’s openness should be of special import to Latter-day Saint readers, for the Latter-day Saint tradition also rejects many absolute elements in the classical view of God and providence ... The Latter-day Saint portrait of God as found in scripture reflects a loving, sensitive, responsive, and concerned God who suffers when his children turn from him and is elated when they seek his fellowship. We read about a God who has endowed his children with significant freedom that allows for free choices, both good and bad. This, too, is how God is understood in openness thought.” David L. Paulsen and Matthew G. Fisher, Review: [Untitled], *BYU Studies* 42 (2003): 3–4.

God.”¹² More specifically, early Church teachings warned, “any rational and intelligent being” must have “a correct idea of [the] character, perfections, and attributes” of God in order to “exercise faith ... unto life and salvation.”¹³ How, then, does the Latter-day Saint reconcile her real experience of inexorable time along with its attendant attributes of uncertainty, weakness, temporality, and decay with the eternal yet responsive character of God and, more significantly, with her own atemporal identity as his offspring? In other words, what role does physical time play in the Latter-day Saint account of the Fall, redemption, and exaltation of humanity?

Though many have written on this topic, it is difficult to marry modern spiritual and scientific insights in an accessible way.¹⁴ Doing so demands multiple and sometimes competing perspectives from philosophy, religion, and science while forcing us to reexamine basic assumptions in each that have long been taken for granted. As a result, discussions quickly become broad, speculative, and even uncomfortable.¹⁵ It is risky to associate transient science too closely with enduring doctrines — it not only undermines the circumspection that science seeks, but believers do not want faith cast aside when scientific winds shift, as they always do. Other difficulties are met when trying to place a metaphysic of timelessness into a logical sequence because the subject itself transcends linearity. For instance, beneath the approximate

12. Smith, *Teachings*, 343–45, emphasis added. See also John 17:3.

13. Smith, *Lectures on Faith*, 3:2,4.

14. Blake T. Ostler’s *Exploring Mormon Thought*, vol. 1, *The Attributes of God* (Salt Lake City: Greg Kofford Books, 2001) discusses the philosophy of time from a Latter-day Saint perspective, but its rigor narrows its audience. C. Robert Line’s recent book *Understanding the Doctrine of God’s Time* (American Fork, UT: Covenant Communications, 2015) is a focused and accessible addition but, like others, lacks scientific sophistication. The most balanced piece integrating Latter-day Saint thought with the physics of time is by astronomer J. Ward Moody, though it is less specific and does not draw on quantum physics to the degree that we do here. (See J. Ward Moody, “Time in Scripture and Science: A Conciliatory Key?” in *Converging Paths to Truth: The Summerhays Lectures on Science and Religion*, ed. Michael D. Rhodes and J. Ward Moody [Provo, UT: Religious Studies Center, Brigham Young University; Salt Lake City: Deseret Book, 2011], 101–22, <https://rsc.byu.edu/converging-paths-truth/time-scripture-science-conciliatory-key>.)

15. Non-Latter-day Saint physicist Frank Tipler offers an attempt to be thoroughly scientific about the immortality of the soul and the reality of the resurrection in *The Physics of Immortality* (New York: Doubleday, 1994). While a worthwhile aim — perhaps especially for Latter-day Saint thinkers — Tipler demonstrates the degree to which secular speculation and assumption can metastasize.

and necessarily linear language of this paper is a network of parallel but recurrent and contrary themes such as coherence and corruption, becoming and being, relativity and rationality, progression and return, causality and agency, mercy, and light.

Still, enduring insight can be gained despite the temporality of the tools. In particular, the Latter-day Saint view makes a compelling case that things temporary and temporal are not flaws but divine tools — often preparatory and merciful in nature — used by God to develop our identity as not just timeless but eternal beings (see Moses 1:39). To show this, we first lay out two competing views of time from Latter-day Saint scripture. Then, drawing on modern scientific perspectives, they are illustrated, justified, and related. This will be of special interest when considered in light of the Fall narrative, since many of the physical conditions and mechanisms needed to understand the emergence, effect, and ultimate transcendence over time have parallels and connections to the conditions necessary for and brought about in God’s plan of redemption (see Alma 42:13). Some experiences such as seership, prayer, and atonement will finally illustrate how God’s nature and our own interact in and out of time. In the end, God’s merciful purposes emerge and are clarified as an effectively timeless character of divine reality comes into view. In that picture we see ourselves as creatures swimming in both time and eternity.

Conflicting Evidence

Latter-day Saint scripture presents conflicting evidence regarding the temporal nature of God and, as we have said, Latter-day Saint thinkers have come down on both sides. Some interpretations suggest time exists on the level of “element” as described in D&C 93:33 — a fundamental component of reality, co-eternal with and uncreated by God. God dwells *in* time (he is Immanent) and thus works within strict temporal bounds. Other views see time as contingent, a property that only arises from the organization of timeless element.¹⁶ This places God *outside* and above time (he is Transcendent). Inasmuch as man is his offspring and ultimately shares in his nature, this also makes mortal time a basically

16. This distinction is consonant with McTaggart’s division of conceptions of time into his A and B series — the A theory is a *tensed theory* in which the past, present, and future is an objective property of reality while the B theory is an *untensed theory* in which these divisions are subjective. See <https://plato.stanford.edu/entries/time/#McTArg>.

exceptional experience. Let us explore these competing interpretations in more depth.

1. God is *In Time* and Bound by It

The Lord told Joseph Smith that all intelligent beings reckon time “according to the planet on which they reside” (D&C 130:4–5). On earth, for example, it is divided into days, months, and years based on the relation of the planet to its governing star. The fact that this reasoning is explicitly applied to “God’s time” (see v. 4) is consistent with Abraham’s report that God himself resides on a planet with particular astronomical features. Abraham 3:2–9 clearly implies that there is a “reckoning of the Lord’s time” and that in it, “one revolution was a day unto the Lord, after his manner of reckoning, it being one thousand years according to the time appointed unto that whereon thou standest” (v. 4). Furthermore, Kolob, the planet or star “nearest to the ... residence of God,” is “last pertaining to the measurement of time” and “moveth more slow” (see facsimile 2, Fig. 1; Abr. 3:5,9). Thus, it appears that God does have a time associated with him, that it is determined by external factors and can be reckoned, but it is such that even prolonged and significant human events are only a “small moment” by comparison (see D&C 121:7).

In addition to these specific passages, there are also many implicit references to the divine’s deference to time. If gospel concepts are authentic, then the themes of creation, conversion, forgiveness, agency, faith, patience, and progression make a strong case for the ultimate temporality of God because they place the past and the future on very different footing — they all assume the dynamic evolution of one state into another. Furthermore, the Lord’s general use of language in scripture — not avoiding words such as “before,” “after,” “first,” “last,” “past,” etc. — implies a real temporal element in the experience of God and man.

2. God is *Outside of Time* and Beyond It

While D&C 130:4 declares that “the reckoning of God’s time, angel’s time, prophet’s time, and man’s time [is] according to the planet on which they reside” it also strongly challenges a traditional understanding of time by stating that “all things ... are manifest, past, present, and future and are continually before the Lord” (v. 7). Indeed, all things of both lower and higher order kingdoms can be made known (v. 9–10). This reality seems to contradict the definition of time as linearly and inexorably accumulating with each successive pass of a planet around its governing star. Furthermore, inhabitants of particular planets — ones that are

a “sanctified and immortal” “globe like a sea of glass and fire” (v. 9, 7) or possessors of particular devices called Urim and Thummim — can apparently view history and future as simultaneous (see Mosiah 8:13, 17; Ether 3:23–25; D&C 130:7). Without distinctions between what is past and what is future, this would suggest that time as we know it is an illusion.

Again, indirect evidence mounts with the usage of concepts such as foreknowledge, truth, omniscience, immortality, eternity, everlastingness, unchangeableness, being, and perfection. Each implies a state that exists without cessation and presumably without need or possibility of change or increase.

God as Both Temporal and Eternal

While it is natural to consider these options as mutually exclusive, it is also possible to marry them. Before speculating as to how this can be done, it may be useful to lay a conceptual framework to prepare our minds for the union. To do this, we briefly consider the Plan, the Principles, and the Presence of God.

God’s Plan

Latter-day Saint doctrine presents God’s plan as cyclic: man leaves his heavenly home to dwell in the immortal yet temporarily paradisiacal state of Eden, corruption and death enter via the Fall, and mortality begins. At the “meridian of time” (Moses 6:62), a Savior intervenes, creating an inflection point. Eventually, by death, man leaves the world only to be reborn in the resurrection as a newly embodied spirit, incorruptible and inhabiting a temporary millennial paradise. Eventually, his return is complete as he reenters his Father’s presence. In this sense, the course of the Lord is “one eternal round” (D&C 3:2; 35:1).¹⁷ But in addition to its cyclic nature, a doctrine of progression or becoming is also strongly evident — upon returning, man is not only *near to* but now also *similar to* God. He is now enabled to begin the cycle again with his own offspring (see D&C 84:35–38; 132:19–20), for he has

17. A general cyclic model of “eternal return” is not unique to Latter-day Saint thought but in fact has ancient and modern roots. Mircea Eliade’s *The Myth of the Eternal Return: Or, Cosmos and History* (New York: Bollingen Foundation, 1954) discusses this and distinguishes two types of time: sacred, which is cyclic, and profane, which is linear and irreversible. This general concept is also reflected in contemporary thought in the formal ideas of Poincare or Nietzschean recurrence, oscillatory cosmologies, or self-similarity (see Carroll, *From Eternity to Here*, 202–27; Tipler, *The Physics of Immortality*, 74–103).

gained not only the capacity for eternal life, but also for “eternal lives” (see D&C 132:24, 55). Thus, even while returning, man progresses along a cumulative, linear path.

The union of these two patterns — progression and return — is familiar to the Latter-day Saint mind, even if not fully understood. Planets make unending orbits, yet they grow old with age. Similarly, man becomes new even as he completes a repetitive course of return. Schematically, then, the human orbit of divine potential is a helix winding ‘round and ‘round even while it ascends. Alternatively, the discrepancy can be resolved as one of scale: like the earth’s surface, time appears flat despite its rounded nature only because our view is limited. In this way, mortal time is the linear unfolding of one tiny segment of one eternal cycle.

God’s Principles

Among the indispensable principles God honors are the twin virtues of Justice and Mercy. Conceived loosely as the inevitable operation of eternal laws and the limited circumvention of these laws respectively, these appear to be opposites. However, taken together — and they must be taken together — they give another metaphor for how time and timelessness can be united in God’s character.

Alma articulates their relationship to his son, Corianton. Justice continually “executeth the law” while Mercy “appease[s] the demands of justice, that God might be a perfect, just God, and a merciful God also” (see Alma 42:13–15, 22). In other words, mercy can operate only in and emerge only from a more fundamental background of eternal justice, not in violation of it — “If so, God would cease to be God” (Alma 42:13, 25). If the methodical and inevitable operation of eternal law can be correlated with timelessness and the properties of mercy with time (we argue for these correlations later), then this presents a framework for gathering the two concepts into one: though perhaps morally primary, Mercy (time) is metaphysically secondary since it emerges from and must be consistent with Justice (timelessness).

God’s Presence

Perhaps the most compelling anecdotal evidence that God can be both temporal and timeless stems from an analogy with his presence. The Restored Church of Jesus Christ uniquely claims that God is both embodied and omnipresent. That is, his person has a specific and well-defined spatial location, and yet Latter-day Saints also comfortably claim that he is everywhere present, aware, and active by means of his Spirit.

But nature has forced our hand: modern scientists must treat time and space on equal footing. The result is that many principles and arguments regarding space have an analogy in time.¹⁸ Hence, it is very reasonable to assume that if God can occupy a specific spatial *location* and yet fill all of space by means of his Spirit, he can equally occupy a specific *moment* while being in and through all times. This simply embraces the dual spatiotemporal meaning of the term *omnipresent* — he is “present” in terms of being *here* as well as in terms of being *now*.

Defining Time

“What then is time?” Augustine famously asked. “If no one asks me, I know: if I wish to explain it to one that asketh, I know not.”¹⁹ This confusion, likely resulting from a messy attempt to unify views (1) and (2) above, can be mitigated if it is realized that (1) defines time only in terms of regular laws and periodic events (i.e. planetary or other motions), whereas the intuitive difficulties with (2) arise from defining a unique temporal direction, one in which time inexorably flows *only* from past to future, not vice versa. The first view is merely the effect of any precise and orderly process as it evolves according to fixed laws; the second, as we will see, is the natural result when these laws operate in complex and uncorrelated systems. A failure to distinguish these physical differences is perhaps the source of much historical confusion.

Greater scientific sophistication has clarified the issues, but it has also made singular definitions of time harder to come by. In his book *From Eternity to Here*, cosmologist Sean Carroll outlines two relevant and common definitions.²⁰ In the first, time is seen in terms of the duration of a process as measured by the relative motions and changes

18. A significant difference is that we can move forward or backward in space but can only move toward the future in time. In part, this is because we have multiple spatial dimensions allowing us to rotate our gaze — if facing north, we can turn to the south by briefly passing through a view of the western horizon. Physicists Stephen Hawking and James Hartle famously proposed how this could be done with time by positing “imaginary time” (imaginary in the formal mathematical sense, not in the colloquial “make-believe” sense). If time can be imaginary, they argue, the remaining differences between time and space effectively vanish, and even the creation of time from the pure space of the Big Bang may be explained (see Davies, *About Time*, 183–95). Interestingly for our purposes (as will be seen shortly), in imaginary time, dissipative systems become cyclic, and vice versa.

19. Augustine, *Confessions*, Book XI, paragraph 17.

20. Carroll, *From Eternity to Here*, 10–25. Carroll actually lays out three definitions, but the first is largely inconsequential for our purposes.

in other real processes such as orbital motions in planets or crystal vibrations in an electronic stopwatch. It is in this sense that Galileo was able to formulate tractable laws of motion before precise clocks existed — he simply compared changes in one part of the universe to changes in another labeled “clock” (In his case, the motion of a ball was tracked using the periodic beats of his heart or the steady accumulation of water in a nearby bucket). The parameter t that litters physics equations today is merely an artifact of this artificial division of the world into “timer” and “timed” because it summarizes, in a single numeric label, the cadence of the “clock” (i.e. some other system) without burdening us with its details. The implication, however, is fascinating: t could be removed if these divisions were mended!²¹ Since these relative changes are presumed to occur according to fixed laws, in this sense time is a fundamental expression of the timeless laws of nature and the relational aspects of its basic constituents (see D&C 88:34–43) and is grounded in precision, order, and wholeness. Furthermore, the characterization of states as either past or future is arbitrary, since the whole of events are, as C.S. Lewis put it, at once “interlocked” by laws. Going from one to the other is more nearly an inevitable logical step than an unanticipated creation. This leads many to confuse such evolution with timelessness itself. We will call this effective timelessness *Periodic Time*.

But time is not just experienced as the fact of change. As Carroll discusses in his second definition, it is also widely correlated with the quality of those changes. Time is not just a static number line with arbitrary, albeit periodic, tick marks and labels; the labels are arranged in ascending order. In experience, this manifests as a temporal direction, known in physics as the *Arrow of Time*, which points to the future and leaves the past irretrievably behind. This steady flow of events toward the future is a property, as we will see, that emerges from the complexity and incoherence of systems. On the everyday scale, it stems from dissipation and loss. This is frequently called *Thermodynamic Time*.²²

21. The reductionist approach employed here by Galileo has been so successful that its compromises are sometimes not appreciated. One of the most pressing contemporary questions in physics is to discover a grand *unified* theory. That timelessness may result from healing the wounds of reductionism is illustrated in the reunification efforts of modern physicists. See footnote 35.

22. The labels Periodic and Thermodynamic are not used elsewhere but are chosen to emphasize the physical mechanisms that underlie each. Other labels could be and have been used. For instance, there is some similarity to McTaggart’s A and B series of time or Mircea Eliade’s writing on the Sacred and Profane mentioned earlier. Philosopher and theologian William Lane Craig has also distinguished

Separating these two times in principle, even though they are inextricable in practice, is possible and important. We can easily imagine a pendulum swinging without dissipation, but dissipation cannot occur without swinging. In a similar way, Periodic Time and Thermodynamic Time do not have equal ontological status: like motion and dissipation, or Justice and Mercy, the latter emerges from and relies upon the former. Recognizing this makes it possible to claim that a divine nature is at once both temporal and (effectively) timeless — options (1) and (2) above both hold but in different senses or on different scales. While a clumsy empiricism conflates the two, being careful about the scientific mechanisms of both dynamics and dissipation elucidates their separate physical origins and even gives a foretaste of the merciful purposes in this dual nature.

The Science of Time

All intelligent beings reckon their temporal experience “according to the planet on which they reside” (D&C 130:4–5). In naive astronomical terms this is straightforward: our experience is divided into days, months, and years based on the motion of our planet relative to its starry heavens. But counting the days is far less than creating them; tick marks don’t make time flow. Section 88 makes clear that these heavenly bodies make their eternal rounds, giving “light to each other in their times and in their seasons, in their minutes, in their hours, in their days, in their weeks, in their months, in their years.” They share light. More than merely providing the means to count time, this light apparently “giveth life to all things [and] is the law by which all things are governed” (D&C 88:7–13, 44–45). In some sense, shared light creates time.

To see this, consider the light of our sun. It shines in periodic cycles — days and nights, summers and winters — to different regions of the earth. Weather patterns, water cycles, and ocean currents are driven by it; plants are nourished and blossom by it; animals sleep, work, and self-regulate by it. Even microscopic geological, chemical, and biological processes are affected.²³ In fact, chronobiological studies show that sunlight is the

Metaphysical from Physical Time (or, similarly, Static from Dynamic). See William Lane Craig, *Time and Eternity: Exploring God’s Relationship to Time* (Wheaton, IL: Crossway Books, 2001). Various other adjectives replacing Periodic could be Deep, Pure, Ideal, Spiritual, or Eternal, the contrasting terms for Thermodynamic Time then becoming Shallow, Corrupt, Real, Physical, or Mortal. In any case, there is general but not precise conceptual agreement between these various proposals.

23. Invisible sunlight contains infrared radiation which affects molecular motion and is experienced as heat; ultraviolet and x-ray light induces deeper chemical processes as in photosynthesis, sunburns, vitamin D production,

principle determinant of the human sense of time.²⁴ Cued by light and proceeding by fixed laws, each individual cycle fits together in a complex interlocking hierarchy of biochemical rhythms — like planetary tracks across the sky or the gears of a clock — causing “our minds [to] construct the past, present, and future ... sometimes [getting] it badly wrong.”²⁵ For instance, when isolated from external time cues (sunlight), human systems can lose their tempo, like an orchestra playing without a conductor. Though each performer follows exact prescriptions under his or her own power, lack of coordination creates disharmony. In humans, this manifests in an altered sense of duration, simultaneity, sequence, memory, anticipation, and even self. Conversely, under the right conditions (e.g. regular days and nights) this discord can be lessened or even avoided. Hence, not only are basic natural traits orchestrated by laws, they are also cued by light. In fact, when properly coupled, collections of timekeepers such as pendulum clocks, electronic oscillators, swarms of pulsing lightning bugs, or human biorhythms can pull each other out of irregularity and into an undiminished synchronicity — the pull of dissipation can be transcended. Just as Thermodynamic Time emerges from Periodic Time, it also can dissolve back into it as systems achieve unity.²⁶ To see how this is, we need to understand the underlying physical laws regarding motion and thermodynamics.

Two Views of Periodic Time

Latter-day Saints have an extraordinary amount of scripture regarding the fundamental laws of creation. Revelation to Joseph Smith states, “all kingdoms have a law given,” these laws are “irrevocably decreed” with

phosphorescent minerals, or when shielding vital organs from a dentist’s x-ray exam; higher energy gamma radiation from solar flares or nuclear reactions at the solar core affects even sub-atomic processes to cause ionization or mutation; and finally, radio waves can interfere with earth-bound electromagnetic devices such as communication satellites. Other microscopic effects of a radiative environment are explored later in the discussion of decoherence.

24. Steven Strogatz, *Sync: How Order Emerges from Chaos in the Universe, Nature, and Daily Life* (New York: Hyperion, 2003), 98–100. The body’s master clock (the suprachiasmatic nucleus) is closely connected to the visual faculty and is located near the optic chiasm.

25. George Musser, “Time on the Brain: How You Are Always Living in the Past, and Other Quirks of Perception” *Scientific American* blog, Sep 15, 2011, <http://blogs.scientificamerican.com/observations/time-on-the-brain-how-you-are-always-living-in-the-past-and-other-quirks-of-perception/>. See also Pascal Wallisch, “An Odd Sense of Timing” *Scientific American* 19, no. 1 (2008): 36–43.

26. See Strogatz, *Sync* for a discussion of the phenomenon of spontaneous temporal self-organization.

“certain bounds . . . and conditions,” and “that which is governed by law is also preserved by law and perfected and sanctified by the same.” Furthermore, a law is given “unto all things, by which they move in their times and seasons; and their courses are fixed” (see D&C 88:34–39; 130:20–21). In its attempt to discover and expound these immutable laws, physics offers two equally valid, somewhat opposed, but complementary theories.

Einstein’s theory of relativity explains the observed fact that duration (Periodic Time) is a personal notion dependent both on one’s motion and environment. Moving clocks run slower, as do clocks near large planets or stars. In fact, if one were to observe a clock moving at the speed of light or resting at the event horizon of a black hole, the interval between tick and tock would be infinite — its time would stand still.²⁷ Although this relativity is consistent with passages such as D&C 130:4–5, it is still surprising. This is in part because it is not merely a perceptual illusion. For a given observer, any dynamic process — whether swings of a pendulum, vibrations of a crystal, or the beating of a heart — will slow in these circumstances because the laws of physics themselves operate at a slowed pace. Furthermore, while one observer might experience one event before another, observers with different speeds or locations could experience the pair as simultaneous or even reversed in order. While this both preserves and constrains our notions of causality,²⁸ it is important to recognize that “it is [still] philosophically possible,” according to Latter-day Saint astronomer J. Ward Moody, “to assign every instant of time [not necessarily every *pair* of instants] as being ‘now’ to someone . . . ‘now’ is not unique.” Continuing his logic: “If every point of time can be called ‘now’ according to some perspective, then the entire extent of time must already be created” in much the same way that every signpost on a journey exists regardless of whether the traveler is currently passing by it. “Therefore all time — and with it, all past, present, and future

27. It is natural to speculate and explore the many obvious theological allegories of relativity theory. For instance, because “God is light” (1 John 1:5) he appears eternal and unchanging. But if we enter his “rest” as a frame of reference and view the human race as he sees it, every instant of time dilates becoming an eternity. At the same time, spatial intervals contract, making “all things . . . continually before the Lord” as one eternal here and now (D&C 130:7; Smith, *Teachings*, 220). For further discussion of the theological lessons of light see David Grandy, “Physical Light and the Light of Christ,” *BYU Studies* 53, no. 4 (2014): 6–36.

28. Causality is “preserved and constrained” because some pairs of events, called time-like related events, cannot be simultaneous or reversed in *any* frame of reference. Only these pairings can be conceived of as being causally related in the traditional sense.

— must already exist.”²⁹ Thus, in a common scientific view, time is not an absolute external condition imposed upon nature. Rather, it is only a malleable part of a larger, fixed “block universe” — an unchanging block of spacetime — and each of us affect it by the way we inhabit it.³⁰

Periodic time is also seen to have an elusive character when considered at the microscopic, or quantum, scale. As expressed in the famous Uncertainty Principle, there is a well-known but still mysterious reciprocal ambiguity in the duration and energy of all processes that contributes to the fact that quantum laws are only probabilistic: they predict only the distribution of results from a large number of “identical” trials, not the individual trials themselves.³¹ But the resulting patterns show a curious coordination — each individual must anticipate and accommodate the behavior of its cohort in order for the predicted pattern to obtain. When all trials occur close together, this is not too surprising — after all, a teacher giving an exam to a large group of students works very hard to avoid “undesirable coordination” (i.e. suspiciously matching answers). What is significant in the quantum case however, is that even if the individual trials are taken one-by-one — even hours apart — the same coordination appears!³² More to the point, what if a teacher went

29. Moody, “Time in Scripture and Science.”

30. Mass and energy can so warp this spacetime that even distant events can become local, much as two distant edges of a blanket can touch when folded. In these wormholes, as they are known, one could pass from one time and place to another far distant one simply by making a short trip. While this sort of time travel is possible in principle and is a rich subject for science fiction writers, the practical limitations and unknowns are still enormous.

31. Formulating an appropriate interpretation of the quantum formalism, such as the Uncertainty Principle, is an open question; some even claim the theory gives no account of a physical world, let alone of time. For this discussion to proceed, then, we must adopt some interpretive stance that necessarily goes beyond the minimalist one. Of the many possibilities, what we say here is largely uncontroversial even if a bit unconventional.

In the most standard quantum approach, however, the problem of time is made more difficult because time is given such a unique role. All “observable” quantities like energy, position, or momentum must be represented a certain way, but time is not. In the standard view, it cannot therefore be considered observable! This prevents giving a coherent account of it. Non-standard interpretations such as the de Broglie-Bohm formulation provide other perspectives. See Peter R. Holland, *The Quantum Theory of Motion: An Account of the de Broglie-Bohm Causal Interpretation of Quantum Mechanics* (Cambridge: Cambridge University Press, 1993), 215–17.

32. This is an adaptation of an analogy by Craig Martens at the University of California at Irvine. To avoid ambiguity, it should be pointed out that it is

so far as to offer each student an exam on different days with a rubric not yet set — only *after* the exam-taking process does she decide whether she will grade only odd-numbered questions or every fifth question, etc. This is a version of what physicists call a “delayed choice” experiment. Even in these cases — cases for which the experimental conditions are not fully set until some time *after* the physical system has been probed — *the time of the decision doesn’t matter!* Coordination persists. Of course, students may talk outside the classroom, but how do they account for their teacher’s *late* decision *at the time* of the exam? It is as if either the students know what the teacher will choose beforehand, or the teacher’s choice can reconfigure the past collusion of the students!

In addition to microscopic co-located events separated in time, correlations can also occur between simultaneous events separated in space. This sort of coupling can result when particles are specially prepared in what is called an entangled state. Continuing the analogy, if two “entangled” students take an exam *at the same time but on distant campuses* their results are correlated. Even with a delayed choice such as suddenly changing the exam conditions, the distant student will be seen to instantaneously respond to the change! This “action at a distance” was famously called “spooky” by Einstein because it seemed to violate the last vestige of causality that relativity theory had so subtly preserved: it manifests *instantaneously*, no matter the distance or how late in the process the causal decision is made. Later work by John Bell and others has confirmed that holding to the familiar idea of locally causal determinism has serious consequences.³³ Therefore, giving a coherent

explaining something as iconic as the quantum two-slit experiment. If one sends an individual electron through two closely spaced slits in a barrier, it will eventually appear as a tiny, randomly located dot on a screen placed some distance away. The quantum formalism does *not* address this. However, if this is repeated with 10,000 identically prepared electrons, the random locations *taken together* form a familiar but still perplexing pattern. It is this *accumulated* pattern that is predicted, verified, and repeatable in quantum theory, *not the individual outcomes*. It is as though the individual electrons — like conspiring students — work together to coordinate their movements. The intuitive explanation — that they can coordinate because they are spatiotemporally “close” — is flawed because the pattern results *even if each electron is sent into the apparatus hours after the previous exited*.

33. In his famous inequality theorem, Bell showed that a doctrine of *local* causation can be preserved only if one gives up the objective reality of microscopic properties. In stark terms, if one holds that the moon *does* exist even when no one looks at it, one cannot also believe in traditional causality. See N. David Mermin, “Is the Moon There When Nobody Looks? Reality and the Quantum Theory,” *Physics Today* 38, no. 4, (1985): 38. For this reason *correlation* is a more fundamental

physical narrative of quantum phenomena has led to the proposal of some decidedly atemporal mechanisms.³⁴ Time simply does not appear to be a well-defined or absolute constraint on the most fundamental scale, even when involving free choices.

Periodic Time as Timelessness

Does time then exist? Redemptive themes in the Christian message suggest the fundamental reality of and accessibility to change — a fact we call mercy — but even this must “appease the demands of justice [eternal laws], that God might be a perfect, just God, and a merciful God also” (Alma 42:15). Ironically, this appeasement itself yields a sort of timelessness because “that which is governed by law is also preserved by law” (D&C 88:34). Thus, the precision and immutability of eternal law allows for or even causes a blurring of the distinction between Periodic Time and what many identify as timelessness.³⁵

consideration than is *causation*. A philosophical analog of this trade-off in determinism is explored in William James’s “The Dilemma of Determinism” in *Philosophers of Process*, 54–78.

34. While fuzzy temporal pictures are not forced upon us, they are one way to broadly accommodate the non-classical behavior of the world. Which is accepted depends on one’s preferred philosophical approach, in particular, it would seem, on one’s proclivity to either preserve or defeat determinism. Among the possibilities are: (1) the de Broglie-Bohm picture which preserves determinism in doing away with purely local interactions; (2) Feynman’s Path Integral formulation that asserts particles simultaneously take all possible paths between points A and B only to distill the indeterminate one through interference; (3) a Many Worlds Interpretation posits an infinite number of parallel temporal sequences; and, finally, (4) there is a growing class of *retrocausal* interpretations which, like Aristotelian Final Causes, seek to make sense of present phenomena from future states (see for example George Musser, “The Quantum Mechanics of Fate,” *Nautilus* 009 (Feb 19, 2015), <http://nautil.us/issue/21/information/the-quantum-mechanics-of-fate-rp>).

35. This is illustrated in part by modern efforts to find a so-called Theory of Everything. Physicist Julian Barbour speculates, “unification of general relativity and quantum mechanics may well spell the *end of time*. By this, I mean that it will cease to have a role in the foundations of physics. We shall come to see that time does not exist.” Barbour, *End of Time*, 14. Consider the Wheeler-DeWitt equation of quantum cosmology, which aims to describe the universe as a *whole*. In finally undoing the Galilean division of things into system and observer, it makes no reference to time! Cosmic evolution is merely the timeless interconnection of possible universal configurations. Paul Davies likewise summarizes, “Quantum cosmology has abolished time ... [it] is *simply meaningless*.” Davies, *About Time*, 180–81. See also “Quantum Experiment Shows How Time ‘Emerges’ from Entanglement,” *Physics arXiv* blog (October 23, 2013), <https://medium.com/>

This equivocation may seem suspect; it certainly has difficulties. Much of this, however, is due to an innate human bias: all mortal experience is temporal, making it difficult even to imagine the possibility of anything to the contrary. Yet it can be simply illustrated by imagining an isolated, rotating sphere. How does even a careful observer know it is rotating? Usually this can be inferred from features that periodically pass through her field of view. But if the sphere is truly *symmetric*, it has no distinguishing features. This produces a motion that is confused with stillness. Only if the sphere were asymmetric — having a tiny pockmark on one side, for instance — would the detection of time's passage be possible (see Alma 40:8).

Pressing further, we can see that even this conclusion is strained: while *marking* revolutions, the pockmark does not *distinguish* them — its first sighting is equivalent to its five-hundredth. Even with a reckoning provided, there is nothing to distinguish what is past from what is future. This makes even measurement impossible.³⁶ Only if the imperfect sphere were *not* isolated, such as by including messy interactions with air or with a surface, would it show a temporal preference — it would grind to a halt. Thus, the mere *presence* of time and its *past-future distinction* are separate but related issues. Though clearly significant to human experience, the latter apparently depends keenly not just on the absence of symmetry but on interactions with a complex environment. This is well understood in the field of Thermodynamics.

Thermodynamic Time Emerges

Periodic time is easily conflated with timelessness in speech, thought, and analysis because “the deep down microscopic rules of nature,” as Carroll calls them, are symmetric with respect to time-reversal.³⁷

the-physics-arxiv-blog/quantum-experiment-shows-how-time-emerges-from-entanglement-d5d3dc850933.

36. Augustine explains: “It is not then [time intervals], which now are not, that I measure, but something in my memory, which there remains fixed. It is in thee, my mind, that I measure times.” *Confessions*, paragraph 35. That is, a mortal measuring of duration always depends, in some degree, on the past-present distinction because once an interval ends, its beginning is in the past.

37. Strictly speaking, the “deep down ... rules of nature” are actually *not* symmetric with respect to time-reversal T. The real symmetry is known as CPT symmetry. That is, T must be accompanied by two other considerations, represented by C and P, for the laws to truly “run equally well forward or backward in time.” As these other conditions are fairly mundane — like requiring you to turn around before retracing your steps from the kitchen — it is rather common for physicists

The underlying laws of nature do not pick out a preferred direction of time, any more than they pick out a preferred direction in space ... Rather, like the up/down orientation space picked out by Earth, the preferred direction of time is also a consequence of features of our environment ... That distinction between the fixedness of the past and the malleability of the future is nowhere to be found in the known laws of physics. The deep down microscopic rules of nature run equally well forward or backward in time from any given situation.³⁸

If this symmetry held at the human level rather than just “deep down,” the future would be as real as the present, death could precede birth, and memory would be indistinguishable from anticipation. While challenging us to formulate notions of free will, causality, and correlation more carefully, these are, interestingly, distinctions that prophetic language seems to often neglect (see Mosiah 3:13; 16:6–7; Jarom 1:11).

This can be illustrated using billiard balls. If one were to watch a movie of two simple and isolated billiard balls colliding, there would be no physical way of distinguishing whether the movie was played forward or in reverse because the laws of physics are satisfied either way — in either case two balls move into the frame, collide, change direction and speed in regular ways, and move out of the frame. However, if the movie consisted of many billiard balls (i.e., not simple) on green felt (i.e., not isolated) there would be a difference. In one temporal direction, a neatly racked set of balls is left in a disorganized configuration, whereas in the other, the disorganized configuration spontaneously pulls together into a racked pattern with only a single ball emerging into the gentle catch of a yielding cue stick. In both cases the balls are perfectly law-abiding — the motion, energy, and forces of each is consistent with known laws. However, in closed systems the *combinations* of motion, energy, and forces *required by the whole* to achieve the second result are statistically impossible, despite being physically allowed. This is because with such a complex system and without any outside influences directing traffic, there are overwhelmingly more roads that lead to disorder than to order, even if the roads are two-way streets.

On the macroscopic scale, this inevitable loss of order gives the impression that events are inevitably marching toward something (disorder). However, this is just the natural result when many

to just speak of T itself when they actually mean a slightly qualified or “fixed-up” version (see Carroll, *From Eternity to Here*, 119–40; Davies, *About Time*, 196–218).

38. Carroll, *From Eternity to Here*, 31–32, 42.

symmetrically interlocked microscopic events evolve according to prescribed and unchanging laws. The irreversible losses are interpreted by mortal minds as future-flowing (Thermodynamic) time. In human molecules, cells, and tissues, the mounting decay particularly manifests not only as aging and death but also as the mental capacity to remember only the past and exercise volition concerning the future.³⁹

Coherence and Decoherence

This description suggests that immortality could be achieved with complete isolation. Only if absolutely cut off from any environmental influence could a neatly racked billiard table remain so forever. In principle, even the slightest vibration or fall of a dust particle could break the order. Similarly, at the atomic level, any environmental disturbance — whether a single particle of light or even a tiny amount of heat (random microscopic motion) — could be enough to deflect a lone particle out of its prescribed place. As with billiard balls (who themselves are complex collections of many particles), this can set off a domino effect leading to the loss of coherent patterns or correlations in the same way that a gentle rain can obscure the symmetry of ripples produced by a stone dropped in a pond. Physicists call this process decoherence.

From either a physical or soteriological perspective, however, isolation is not only undesirable, it is impossible. Even when the proverbial billiard room of the atomic world is walled-off, cooled, darkened, suspended, and evacuated, something seething remains. A space once regarded as absolutely empty, still, and cold is, in fact, irreducibly filled with roiling energy, particles, and fields. As a shifting stage for existence, this new “vacuum” prohibits isolation. Instead, it *guarantees* a degree of restlessness at the smallest scales that may account for time’s arrow, because even orderly systems are quickly rattled loose by the subtle yet constant bombardment of something within which they are inevitably immersed.

Curiously, this universal field also plays a physical role analogous to the spiritual one filled by the Light of Christ — it “proceedeth forth [from our Creator] to fill the immensity of space” and is “above,” “in,”

39. Carroll gives an account of memory as arising from asymmetric time in Chapter 9 of *From Eternity to Here*. See also Stephane Rogeau, “We Do Have Memories of the Future; We Just Cannot Make Sense of Them,” *PhilSci Archive* (Oct 1, 2014), <http://philsci-archive.pitt.edu/11303/>. It is common to believe living systems provide a refutation to this general pull toward disorder. However, they typify it. They are merely *open systems* that are particularly good at absorbing energy from and offloading disorder into their environment. This allows for organization and growth.

“through,” and “round about all things.” More significantly, both have been associated with light and heat.⁴⁰ Taking this loose association seriously, we may speculate as to one way in which the Light of Christ “giveth [at least a rudimentary] life to all things” and is a basic “law by which all things are governed” (D&C 88:12–13, 41): like thermal or quantum fluctuations, it may provide a gentle stirring in all things — a sacred imprecision — that makes their future different from their past. Like rolling waters seeking their level (see D&C 121:33) or sunlight dispersing from an organized sphere “to fill the immensity of space,” this asymmetry seems to leave the principles of life, growth, and order in its wake. But how is it done?

While preventing the isolation that would nominally save us from the ills of Thermodynamic Time, quantum laws ironically (and the Light of Christ unsurprisingly) may also provide a way to overcome its ravages. Once opened to others around them, systems don’t just lose their self-coherence, they become increasingly connected with their environment — ripples on a pond do lose their pristine circularity in the rain, but the new pattern more fully reflects the atmospheric whole.⁴¹ When this happens, spontaneous

40. “Joseph Smith is reported to have taught ‘that all light and heat are the “Glory of God,” which is his power, that fills the “immensity of space,” and is the life of all things, and permeates with latent life, and heat, every particle of which all worlds are composed.’” Cited in Hyrum L. Andrus, *God, Man, and the Universe*, vol. 1, *Foundations of the Millennial Kingdom of Christ* (Salt Lake City: Deseret Book, 1968), 262. (As part of the vacuum, the afterglow radiation from the Big Bang also fills the universe with a tiny, irremovable trace temperature). After citing similar evidences in 1908, John A. Widstoe also writes, “Such quotations, from the men intimately associated or acquainted with the early history of the Church, prove that Joseph Smith taught in clearness the doctrine that a subtle form of matter, call it ether or Holy Spirit, pervades all space; that all phenomena of nature, including, specifically, heat, light and electricity, are definitely connected with this substance.” John A. Widstoe, *Joseph Smith as Scientist: A Contribution to Mormon Philosophy*, (Grantsville, UT: LDS Archive Publishers, 1998), 26. Although the idea of a classical ether is in disrepute, the essential teaching of the Prophet still lingers in modern science. Nobel Laureate and Stanford physicist Robert B. Laughlin explains, “The word ‘ether’ has extremely negative connotations in theoretical physics because of its past association with opposition to relativity. This is unfortunate because, stripped of these connotations, it rather nicely captures the way most physicists actually think about the vacuum ... space is more like a piece of window glass than ideal Newtonian emptiness” in *A Different Universe: Reinventing Physics from the Bottom Down* (New York: Basic Books, 2005), 120–21.

41. An article by Natalie Wolchover summarizes recent proposals to link the arrow of time to the wider spread entanglement resulting from decoherence rather than to the classical idea of increasing disorder.

self-organization is possible.⁴² Even if initially out of sync, two pendulum clocks can eventually and naturally come to swing in unison because they hang on a shared wall.⁴³ Distant particles can display perfectly coordinated properties if properly prepared and coupled. When conditions are right, entangled systems can actively pull each other out of chaos and into unison — even across time and space — spontaneously overcoming the natural but degrading march towards disorder.

As one of many examples, consider the phenomenon of superconductivity. Under normal conditions, a flowing electrical current will quickly diminish due to the resistance that stems from the decohering influence of the metal nuclei through which the electrons must clumsily flow. This is often overcome by providing a power source such as a battery. However, in certain materials and at sufficiently low temperatures, the flowing electrons couple, the two acting as a whole. In this special state, resistance vanishes! Electrical current can flow endlessly, without loss and without a power supply.⁴⁴ Each pass around the circuit marks the passage of (periodic) time — motion happens — but no degradation occurs; the last cycle is indistinguishable from the first. Is it too much to wonder about the possibility of a similar potential for the quantum matter of which we ourselves are made?

Our Fall into Time

The scientific account of the onset of temporality is mirrored by a corresponding doctrinal one. The scriptures indicate that time as we know it became identified with earthly experience at the Fall of Adam. Lehi tells us

Natalie Wolchover, “Time’s Arrow Traced to Quantum Source,” *Quanta Magazine*, April 16, 2014, <https://www.quantamagazine.org/quantum-entanglement-drives-the-arrow-of-time-scientists-say-20140416/>.

42. While we provide a physical rationale for the divine tendency to order, in contrast to the natural tendency to disorder, others have taken a more general approach. See Hugh Nibley, “The Meaning of the Temple” in *Temple and Cosmos* (Provo, UT: Neal A. Maxwell Institute for Religious Scholarship, 1992). <http://publications.mi.byu.edu/fullscreen/?pub=1123&index=4>.

43. Water molecules self-organizing into crystals in the presence of a cold environment is another common example. For further exploration of this phenomena as it manifests in animate and inanimate systems, see Strogatz, *Sync*. For the historical discovery of the specific behavior in pendula mentioned, see pp. 103–108.

44. In experiments, current has been observed to flow for years without significant attenuation, something that would normally happen in fractions of a second. Presently, much research is directed at creating high-temperature superconductors, circuits for which dissipation can be avoided in everyday-type environments (see <https://en.wikipedia.org/wiki/Superconductivity>).

that while in the pure paradise of Eden, “all things which were created must have remained in the same state in which they were after they were created; and they must have remained forever, and had no end” (2 Nephi 2:22). This is not to say that time (in a periodic sense) didn’t exist — planets had their motions, light shined in patterned ways, laws operated — but the organization and environment was such that things avoided decay. Whether in the thermodynamic act of metabolizing fruit or in his expulsion from the edifying environment of Eden, Adam’s Fall caused his system to become corruptible (i.e. subject to decoherence).⁴⁵ This raised the need to “put on incorruption” again, otherwise his flesh would “[lay] down to rot and to crumble to its mother earth, to rise no more” (2 Nephi 9:7).

Alma’s epistle to Corianton further tells us that these changes not only cut man off from God spiritually but “temporally” as well (see Alma 42:7). Many take this to mean that man was spatially separated from God’s divine presence and placed on this earth, but “temporally” refers directly to time.⁴⁶ Thus, a literal reading suggests Adam was removed from an experience of time that he shared with God and was placed in one that was in some way incommensurate with his eternal nature. This is supported by Alma’s summary, “And thus we see, that there was a time granted unto man” (Alma 42:4). To emphasize that this new order was

45. Although corruption is often used interchangeably with evil and sin, it is used here in the same way a computer file becomes corrupted: alterations are introduced that do not preserve the original intent or order. In this view, corruption leads to *death*, not necessarily to *sin* (though it does make it possible) — Jesus Christ is an example of a sinless life in a corrupted tabernacle. Thus, corruption is not synonymous with *sin* but with *weakness* or *mortality*. Its opposite is not *righteousness*; it is *purity* or *coherence*. It is in this sense, we argue, that creation was corrupted in the Fall.

46. The Latin root of “temporal” is *temporalis* or *tempus* meaning time. The fact that “temporal” is casually taken to mean worldly, mortal, or earthly seems to derive only from the fact that time is the inescapable metaphysical backdrop for these conditions. It is significant that the translation of Alma’s message (found in chapters 39–42) invokes the specific phrase “*temporal* death” since many other adjectives could have been used. As further evidence that timing and duration specifically were on Alma’s mind, note the word “time” appears 16 times in a 7-verse span of chapter 40 wherein Alma addresses questions of the timing and foreknowing of events in and out of mortality. This includes the statement, “Time is only measured unto man” (v. 8). While Alma 41 doesn’t use “time” specifically, it connects Justice to the Doctrine of Restoration just as we have connected it to cyclic return and Periodic Time. Alma 36 furthers this progressive-yet-cyclic theme in its famous chiasm. Finally, we have cited Alma’s discussion of Justice and Mercy in chapter 42 as archetypal of time and timelessness, which he also illustrates using the Fall narrative.

not created *ex nihilo* but was merely an extension or adaptation of an already extant dynamic (Periodic Time), Lehi alternatively writes that time was “prolonged” or “lengthened” (see also 2 Nephi 2:21).⁴⁷

As we have seen however, separations in time are often representative of separations in space. Some early leaders of the Church taught that coincident with Adam’s fall, the Earth literally fell from its birthplace near Kolob to its present place in the solar system, thus obtaining a new reckoning (see Abr. 5:13).⁴⁸ Though far-fetched by modern scientific standards,⁴⁹ if true, the implications of this are not only significant but remarkably consistent with the account we have developed so far. Removing the earth from the Kolobian environment in which it was first formed would bathe it instead in the presumably coarser solar gravity and radiation. With the fixed rules of relativity and quantum mechanics, this new “glory” could dilate and decohere Edenic systems at a much different rate. More than mere accounting, this would change the clocks themselves (altering decay rates and transition probabilities) and potentially wash away the subtle correlations that unite and sustain otherwise decaying

47. This agrees with St. Augustine’s description of time as a “distention” or “protraction” of the soul or mind away from God. *Confessions*, Book XI. Moody makes a similar, though less-developed argument. He writes, “Here is speculation that must be viewed as such. Adam and Eve lived in a garden where they did not have to farm to obtain food. The Garden of Eden took care of itself and brought forth fruit spontaneously without labor. Does this mean the law of increasing disorder was not in effect for them? After the Fall they were cast into a world where they earned their bread by the sweat of their brow, fighting, as we do today, the consequences of increasing disorder. Was the Fall of Adam an injection into a world where the law of increasing disorder, and hence time, functions as we know it now, while before in Eden it did not? Can we say, then, that time as we know it began at the Fall?” Moody, “Time in Scripture and Science.”

48. Joseph Smith, Brigham Young, Parley P. Pratt, John Taylor and others taught this. For instance, Apostle Erastus Snow pointed out, “Until the earth assumed its position [in this solar system] ... present modes of reckoning time could not be appointed to man — either our days, or months or years, all of which are determined by the revolutions of the earth upon its axis, and the moon around the earth, and the earth in its orbit around the sun.” For references and a thorough discussion that attempts to formulate a coherent account of prelapsarian events while taking this teaching seriously see Eric N. Skousen, *Earth: In the Beginning* (Orem, UT: Verity Publishing, 1997), 225–59 (see p. 150 for above quote).

49. This idea is not as foreign as it may have once appeared. Models of planetary migration for solar system formation are being proposed (see “Exoplanets’ Complex Orbital Structure Points to Planetary Migration in Solar Systems,” University of Chicago, Phys.org, published May 11, 2016, <https://phys.org/news/2016-05-exoplanets-complex-orbital-planetary-migration.html>).

bodies, thus creating a new mortal estate. Whatever the actual processes during the Fall, the net result is that all individual bodies — those of people organized into families, those of particles organized into tissues — tend toward a state of ultimate disorder and decay; the organizations of which they are constituents approach dissolution. Interestingly, inasmuch as these bodies live a celestial law — by Latter-day Saint standards one espousing purity and consecration, leading to harmony and oneness — these degrading effects would presumably cease, making thermodynamic “time no longer” (see D&C 88:21–32, 110).

It is significant, then, that this temporalizing process was not just allowed but actively preserved in the Fall. After partaking of the Tree of Knowledge, the Lord was quick to block the way to the opposing tree “lest [Adam] should put forth his hand, and take also of the tree of life, and eat and live forever.” Importantly, we are also told why: “If Adam had put forth his hand immediately, and partaken of the tree of life, he would have lived forever [in an unchanging yet corrupted state], according to the word of God, having no space [time] for repentance” (Alma 42:3, 5). Thus, because of the introduction of death and the time that carries us toward it, our state “became a probationary state; a time to prepare to meet God; a time to prepare for that endless [timeless] state which has been spoken of by us, which is after the resurrection of the dead” (Alma 12:24, see 21–27). In other words, along with its limitations, (Thermodynamic) time brings opportunities.

Merciful Consequences of Time

Amidst its messiness, disorder, forgetfulness, weakness, and limitation, Thermodynamic Time brings with it two important possibilities: *development* and “*ends*.” These prepare and provide for other “beginnings” vital to the Christian dynamic such as repentance, rebirth, and becoming a new creature. This makes sense since only in a world of “ends” and “beginnings” are changes allowed that go beyond just the operation of impassionate and timeless law. To illustrate, let’s consider how mortal time expands freewill to become what is an otherwise latent moral agency.

Latter-day Saint understanding suggests that moral agency requires three elements: (1) an ontological structure of *law in nature* must exist that establishes genuine alternatives as the sure consequences of particular actions; (2) finite minds must be able to *learn and understand* so that it is possible for them to comprehend the actual nature of these alternatives;

and (3) the mere *freedom to act* must exist.⁵⁰ While prelapsarian man possessed this raw ability (3), he may have lacked a *full* agency because one or both of the first two conditions remained unsatisfied.⁵¹ The emergence of linear time facilitates the satisfaction of the first two conditions.

1. Causality, Predictability, and Classicality

To see how mortal time could have established (1), consider decoherence. While not knowing the precise conditions surrounding the Fall, we know different environments can cause matter to display very different — sometimes abruptly different — features. To be sure, systems could evolve faster or slower, but more importantly, the *character* of physical law can also significantly change. Just as a slight change in temperature causes liquid water to become solid — the former described by complex fluid dynamics, the latter a block whose motion is much simpler — paradisiacal, immortal, atemporal creation could have crystalized into a more concrete, causal, and determinate state simply because of the environment into which it was then placed.

As we have seen, *isolated* microscopic systems can evolve as if in many states at once; these possibilities can interfere, correlations can entangle widely separated bodies, and observations are constrained by irremovable uncertainties. But these traits would limit agency because by them, individual mortal agents can't unambiguously predict the consequences of their actions. By contrast, in the everyday (Newtonian) world, objects have a definite state, they concretely exist, reductionism is

50. See D. Todd Christofferson, "Moral Agency," *Ensign* 39, no. 6 (June 2009): 46–53.

51. On this point, there is an inherent tension in the Latter-day Saint Fall narrative. On one hand, it is clear that man exercised choice *prior* to the Fall (see Alma 13:3), yet various passages report God as saying, "*in the Garden of Eden*, gave I unto man his agency," at least a portion of which entailed expanding his vision to comprehend opposition (Moses 7:32; see also Moses 6:55–56; 2 Nephi 2:26–27; Alma 42:7 (2–7)). Put differently, Adam's presumably informed choice in the garden required knowledge of alternatives but this was the very knowledge he stood to gain from making the choice. See Alonzo L. Gaskill, *The Truth About Eden: Understanding the Fall and our Temporal Experience* (Springville, UT: Cedar Fort, 2013). It appears that Elder Christofferson's trio of elements — similar to Lehi's three themes of law, opposition, and action in 2 Nephi 2 — bring these ideas into sync: in the garden, Adam possessed a raw freedom to act (3) but he was not yet a *full* moral agent because he could not yet comprehend the nature of the opposites (2). We have called this condition "latent agency." Pre-mortal agency presumably became latent when Michael crossed the veil to become Adam, thus necessitating its restoration, and even expansion, in the Tree of Knowledge. Time facilitates this process.

an adequate approximation, and properties are reasonably unambiguous. How can this be? What makes the indeterminate and connected order causal and bite-sized? Decoherence — the same process that contributes to Thermodynamic Time — is generally regarded as the mechanism by which this quantum-to-classical transition is achieved. When it is included in scientific models, persistent paradoxes melt away, leaving an everyday world that is the well-defined, causally determinate, sensible one of which we are so fond. A world emerges in which distinct alternatives actually and recognizably exist.⁵² This mimics Lehi's language as he also derives agency from the fall of nature: all things were a metaphysical "compound in one," until temporality removed superpositions of right with wrong, or "sense" with "insensibility," enabling us to be "enticed by the one or the other." By this, he says, "the Lord God gave unto man that he should act for himself" (2 Nephi 2:11, 16).

2. Logic, Learning, and Rationality

Metaphysical distinctness allows an epistemic clarity that makes rational thought and learning possible in finite minds, satisfying condition (2) for moral agency. This is because the linearity imposed by the Arrow of Time places certain realities in order — or at least forces us to comprehend them one-by-one — so the mind is led along a sequential path (experienced in time as logic) that makes the conclusions compelling. Thus, although objects and ideas may exist in a web of somewhat symmetrically interlocked being, it is natural to speak more linearly of a "chain" of reasoning that terminates in a conclusion that "follows."⁵³

52. Moody also connects the temporality introduced at the Fall to choice: "The Fall cast Adam and Eve into a world where they could choose for themselves. They could choose before then, but not in the same full sense that they could after the Fall ... Time is what facilitates choice." Moody, "Time in Scripture and Science." This connection is also reflected in the writings of Augustine and in Henri Bergson's *Time and Free Will: An Essay on the Immediate Data of Consciousness*, trans. F. L. Pogson (London: George Allen and Unwin Ltd, 1950).

53. Despite the enduring nature of logic itself, the *practice* of the logician does depend on time. While the Law of Non-Contradiction stands indefinitely — a thing cannot objectively be both A and not A *at the same time* and in the same way — it assumes a definition of simultaneity that Einsteinian relativity prohibits. Furthermore, a cognitive connection between rational thought and time is revealed in the psychological effects of the internal desynchronization that results in time isolation studies. Some subjects detach from normal, rational functioning, nearly going mad. It has also been suggested that an uncommon rigidity of our internal sense of time may explain schizophrenia (see Wallisch, "Odd Sense of Timing"; Musser, "Time on the Brain"; Strogatz, *Sync*).

To illustrate, imagine doing a puzzle. Can one complete it by simply opening the box and looking at the pieces? Probably not. Rather, a common approach is to create a space on which to spread out the pieces such that no two are interfering or overlapping each other. Only then will the solver comprehend the task and execute it rationally, or deliberately. In a similar way, can one do a puzzle without spreading it out in *time*? If it weren't for the sequential nature of forward-flowing time, the realization of the end result would be clouded by the simultaneous confusion of the beginning with the errors of the middle, all present in one complex but "eternal now." For a god, presumably, this is unproblematic, but for creatures of finite capacity, this would not only disorient but also destroy. In this state, Lehi argues, we would not experience joy or pain, neither "happiness nor misery ... wherefore there would have been no purpose in the end of our creation" (2 Nephi 2:11–12). Thus the injunction to take everything "in order," "line upon line, precept upon precept" (Mosiah 4:27; 2 Nephi 28:30), to continue from "grace to grace" (D&C 93:13), is not merely an ethical maxim but a rational, or even metaphysical, imperative. Milk simply cannot come before meat if there is no "before."

This has at least two important implications for our learning and growth as agents. First, tasks are not only more digestible in this way but also less threatening. With temporality we can "learn from [our] experience without being condemned by it," because change and recovery is possible.⁵⁴ It literally gives us time to learn, a "space for repentance" (Alma 42:2–5), and *prepares* the mind for and even *necessitates* that mental exertion toward the future that is faith.⁵⁵ Second, seeing how time enables rational thought helps us appreciate what might be characterized as irrational yet clear cognitive moments. Just as learning "by study" requires time to sort through and assemble the jumbled mess of concepts presented by experience, learning "also by faith," or by revelation (see D&C 88:118), can allow one to comprehend complex ideas *as a whole in an instant*. Joseph Smith described this as receiving "*sudden strokes of ideas*" as "pure intelligence flow[s] into you,"⁵⁶ a seemingly time-independent process. It is from these "sudden strokes of ideas" that the rational sequence of temporal articulation often grows. C.S. Lewis explained this saying, "something beyond Nature [beyond that which is bound by spacetime] operates when we reason ... Each [human mind]

54. Bruce C. Hafen, "The Atonement: All for All," *Ensign* 34, no. 5 (April 2004).

55. Smith, *Lectures on Faith*, 7:3.

56. Smith, *Teachings*, 132, emphasis added.

has its tap-root in an eternal, self-existent, rational Being, whom we call God.” In this way, “[our] rationality [even while playing out in time] is the little telltale rift in Nature which shows that there is something beyond or behind her.”⁵⁷

So authentic, in fact, is our need for temporal sequence and so real the (effectively) timeless perspective of the Divine, that even God recognizes a need to navigate the differences. Doctrine and Covenants 29:31–35 states that “all things,” including man, are created “both spiritual and temporal,” but the spiritual (*atemporal*) is more fundamental (see v. 34). The Lord “[speaks] unto [us] that [we] may naturally understand; but unto [him his] works have no end, neither beginning; but it is given unto [us in these terms] *that [we] may understand*” (see also 50:10–12). Hence, the temporal language of God to us may be interpreted as merely a merciful convenience, not an expression of his limitation but of his accommodation of ours. In this way, God further facilitates the agency of man, for he provides for our preparation, pondering, learning, proving, and most importantly repentance, none of which could occur in the Garden of Eden as it was (see 2 Nephi 2:22–23, 27).

Given that mortal minds operate vitally on temporal sequence, it is expected that questioning time will be difficult, even irrational. But in these cases, especially in discussing the nature of God, it seems very plausible that it is not the premises that fail as much as our own mental capacity for making sense.

God’s Nature and Ours

To illustrate the implications of the view proposed here, consider the famous philosophical question, Can God *know* the future? If he does, many argue we cannot be truly free (fatalism). Conversely, if we are truly free, God cannot know all future with absolute, specific foreknowledge (incompatibilism; the position that such knowledge is consistent with free will is compatibilism).⁵⁸ In addressing this question, we’ll assume God interacts with time in a dual manner (as do we) but because he is

57. C. S. Lewis, *Miracles: A Preliminary Study* (New York: HarperOne, 2001), 38, 43, 45.

58. The qualifications “all,” “absolute,” and “specific” of God’s foreknowledge are common in philosophy but carry much baggage. We hope to avoid this baggage because it is too technical and distracting for our purposes. By “all” we simply address whether God knows everything or if it excludes indeterminate events such as acts of freewill; by “absolute” we address whether God’s knowledge is in principle certain or probabilistic, and by “specific” we address whether God has a knowledge of minute details or only of larger, overarching trends.

pure and incorruptible, at least part of that interaction — specifically the part that distinguishes past from future — is very different from ours. Also, and importantly, we must take special care due to the fact that because time is necessary for rational thought, there will be no purely rational arguments (even here) that can unambiguously discuss time (see Isaiah 55:8–9). The failure of compatibilist arguments, therefore, may not be a failure of compatibilist doctrine but only of our ability to construct arguments independent of uni-directional, linear time. For instance, the formulation “Can God know what I will freely choose before I choose it?” *assumes* a posture with respect to time that begs the question — invoking *foreknowledge* at all biases the discussion — because it assumes the term “before” has a singular meaning.⁵⁹

Without clarity on these subtle points, there has been some ambiguity on the question of divine knowledge in Latter-day Saint theology.⁶⁰ Some have suggested that God’s knowledge is merely a function of his familiarity with his children,⁶¹ and some have disagreed.⁶² Many

59. As we saw in the discussion of relativity theory, a non-*causal* relationship — a *correlative* one, perhaps — between an event and God’s knowing of it would make “before” a relative term.

60. In a critique of “The Mormon Concept of God” evangelicals Francis J. Beckwith and Stephen E. Parrish observe: “When it comes to the doctrine of omniscience, Mormons appear to be divided. Some Mormons seem to believe a view of omniscience that is consistent with classical theism, that God has perfect knowledge of past, present, and future. On the other hand, there is a much more dominant tradition in Mormonism which teaches that God knows everything that can possibly be known, but only that which is actually occurring (the present) or has occurred (the past) can possibly be known.” Francis J. Beckwith and Stephen E. Parrish, *The Mormon Concept of God: A Philosophical Analysis* (Lewiston, NY: Edwin Mellen Press, 1991), 41.

61. In *The Articles of Faith* Elder James E. Talmage writes: “God’s knowledge of spiritual and human nature enables him to conclude with certainty as to the actions of any of his children under given conditions; yet that knowledge is not of compelling force upon the creature.” James E. Talmage, *A Study of the Articles of Faith: Being a Consideration of the Principal Doctrines of The Church of Jesus Christ of Latter-day Saints* (Salt Lake City: Deseret Book, 1984), 173. This is the most official statement of this idea of which we are aware. It is also the softest. Other less authoritative writers make the case more forcefully.

62. Beckwith and Parrish report: “[Elder Neal A. Maxwell] writes, ‘The past, present, and future are before God *simultaneously* — Therefore, God’s omniscience is not solely a function of prolonged and discerning familiarity with us — but of the stunning reality that the past, present, and future are part of an “eternal now” with God.’” Beckwith and Parrish, *Mormon Concept*, 50. However, Latter-day Saint philosopher Blake T. Ostler writes, “In fairness to Elder Maxwell, we must recognize

Latter-day Saint incompatibilists align themselves with Process or Open theology as advanced by Whitehead or Pinnock respectively. Of Open Theology Pinnock writes:

Though we wither and die, God abides and is not threatened or undone by time. We need an understanding of God's eternity that does not cancel or annihilate time but stands in a positive relation to it ... When I say God is eternal I mean that God transcends our experience of time, is immune from the ravages of time.

To explain he then continues,

Philosophically speaking, if choices are real and freedom significant, future decisions cannot be exhaustively foreknown ... the future is not fixed like the past, which can be known completely. The future does not yet exist ... Future decisions cannot in every way be foreknown, because they have not yet been made. God knows everything that can be known — but God's foreknowledge does not include the undecided.⁶³

As a solution, Pinnock goes on to propose that God, like a wise (and perfect) parent, knows us intimately and how we are likely to react in any given situation and He genuinely reacts himself. He does not *foreknow* our choices any more than our mortal parents do, but He handles them with wisdom and grace when they occur.

While Pinnock's first sentiment above is reflective of and even calls for the dual definitions of time we have developed here, the conclusions drawn in the second quotation equivocate on these definitions and exclusively emphasize the mortal and asymmetric perspective that "the

that his observations are meant as rhetorical expressions to inspire worship rather than as an exacting philosophical analysis of the idea of timelessness." He continues, "Furthermore, in a private conversation in January 1984, Elder Maxwell told me that he is unfamiliar with the classical idea of timelessness and the problems it entails." Ostler, *The Attributes of God*, 50. Ostler's private discussion with Elder Maxwell notwithstanding, as late as May 2003 Elder Maxwell again stated, almost as if recalling this specific conversation, "Our own intellectual shortfalls and perplexities do not alter the fact of God's astonishing foreknowledge, which takes into account our choices for which we are responsible. Amid the mortal and fragmentary communiqués and the breaking news of the day concerning various human conflicts, God lives in an eternal now where the past, present, and future are constantly before him." Maxwell, "Care for the Life of the Soul," *Ensign* 33, no. 5 (May 2003).

63. Pinnock et. al., *Openness of God*, 120, 123, emphasis added.

future does not yet exist” (despite Moody’s suggestions to the contrary). Openness theology thus fails to recognize that the “distinction between the fixedness of the past and the malleability of the future is nowhere to be found in the known laws of physics,” as Carroll stated. It is only an emergent property of something more timeless. This oversight biases the conclusion. Beyond these philosophical technicalities, this approach preserves agency only by interpreting God’s knowledge as that of a mortal chess master: his victory is *statistically* certain because of perfect strategy, familiarity, and crises management skills, not knowledge “of things as they really will be” (see Jacob 4:13; D&C 93:24).⁶⁴

While the incompatibilist answer is common among Latter-day Saints who rationalize God’s knowledge, it is not a necessary conclusion. There are instead several reasons to accept the compatibilist view. To begin, one need not presuppose an asymmetry to time that is not forced upon us either scripturally or scientifically. It appears to be only a function of our local experience and grammar, not of fundamental reality. Like the blind violinist who “sees” the curves of his instrument with his hand sequentially and who cannot anticipate what comes next or even conceive of color, we see the course of our lives unfold along a directed timeline and cannot conceive of something to the contrary. God, on the other hand, has developed the power to “open his eyes,” taking in the whole of the violin at once — neck, body, and strings in an orchestration of color. He comprehends the curves, the context, and the player at once.⁶⁵

This view is also supported by the scriptural distinction of prophet from seer, a distinction rarely found in the relevant literature but uniquely

64. See James, “Dilemma of Determinism.” However, a difficulty with this type of familiarizing analogy is that it is only valid in the limit as one’s godliness approaches infinity, analogizing it with continuous limits familiar in calculus. We simply disagree that those limits apply. Due to the reality of the mysterious but fundamental transformations of rebirth, sanctification, becoming a new creature, receiving a new heart, obtaining a resurrected body, and gaining celestial glory, our approach to Godhood appears to be rather *discontinuous*. Without this realization, any metaphorical limit merely projects what we are onto God rather than arriving at what he is.

65. Even though the blind violinist experiences the violin’s features in sequence, the first need not *cause* the second any more than the neck must *cause* the body. Rather, the causal relationship is an expression of the fact that these features are ontologically interlocked (correlated) by their natures into a whole. It is from this sensuous sequence that we infer cause and effect. What we are incrementally knowing is just the law of one’s own nature articulated “after the manner of the flesh,” “line upon line” (see Alma 7:12–13; 2 Nephi 28:30; Isaiah 28:9–11).

developed in Latter-day Saint restoration thought.⁶⁶ By definition, seers, including God, actually *see* events. Their experience appears to be visual, not just vague, implicit, or manufactured abstractions. Perhaps this is why Limhi states that “a seer is greater than a prophet” — in prophecy, the latter declare *contingencies* based upon past and present circumstances while the former possess a “high gift from God,” being able to “look” and

know of things which are past, and also of things which are to come, and by them [seers] shall all things be revealed, or, rather, shall secret things be made manifest, and hidden things shall come to light, and things which are not known shall be made known by them, and also *things shall be made known by them which otherwise could not be known*. (Mosiah 8:13–17)

Accordingly, the Brother of Jared was given two stones and a pair of spectacles, the Urim and Thummim, that would “magnify to the eyes of men” all the Lord desired to reveal such as, in his case, “all the inhabitants of the earth which had been, and also all that would be ... even unto the ends of the earth” (Ether 3:23–25). The receipt of a similar device enabled Abraham to see the stars from the least to the greatest, each with their specific times and seasons, names and orders (see Abraham 3). Joseph translated ancient records by looking at or through stones, enhancing what must have been a visual experience. Finally, those who inherit God’s presence will dwell on a planet that is itself a Urim and Thummim giving them vision of “inferior kingdoms” and will receive a small white stone by which they can “see all things pertaining to a kingdom of a higher order” (D&C 130:4–11).⁶⁷

Visions offered by the seeric gift can also contain amazing resolution. In addition to the cases just cited, Isaiah (and Nephi) report the experience of Martin Harris and Charles Anthon with stunning specificity (see 2 Nephi 27), the fall of a sparrow or hair of the head is not unnoticed (see Matt. 10:29–31), and Nephi predicts the details of a crime scene and a subsequent interrogation with an accuracy that is apparently legally binding (see Helaman 8–9). Likewise, when Moses spoke with the Lord, he

66. In his book, Pinnock discusses the Openness view of prophecy extensively. He does not, however, distinguish or take up the separate, but related, topic of seership.

67. In these cases, it is interesting and instructive that seers require a physical device of some kind. Whether mortal or immortal, they do not appear to live in a constant state of seeing (and knowing) but only have the gift of being able to rise to claim this knowledge when necessary. This may tell us something of the nature of God’s temporal experience.

cast his eyes and beheld the earth, yea, even all of it; and *there was not a particle of it which he did not behold*, discerning it by the spirit of God. And he beheld also the inhabitants thereof, and *there was not a soul which he beheld not*; and he discerned them by the spirit of God. (Moses 1:27–28)

As with the Brother of Jared, Isaiah, Nephi, or Moses, Latter-day Saints claim that “if [a man] believe[s] in [Jesus Christ] that he could show unto him all things — it should be shown unto him; therefore the Lord could not withhold anything from him, for he [would know] that the Lord could show him all things” (Ether 3:26). Though certainly not definitive, these passages suggest a more stable scriptural basis for the absolute and specific knowledge of God than is recognized in traditional arguments.⁶⁸

C.S. Lewis articulates a compatibilist view as it relates to freewill, petitionary prayer, and providence. To “correct the admittedly false picture of Providence” as involving a clockmaker God who determines all events both evil and good at the outset by setting things in motion, Lewis says

It is probable that Nature is not really in Time [as several physicists suggest] and almost certain that God is not. Time is probably (like perspective) the mode of our perception. There is therefore in reality no question of God’s at one point in time . . . adapting the material history of the universe in advance to free acts which you or I are to perform at a later point in Time. *To him all the physical events and all human acts are present in an eternal Now.*

To illustrate the reconciliation this idea offers, Lewis discusses an instance of prayer, while taking care to keep separate time as the inevitable action of law from time as a past-present distinction.

Most of our prayers if fully analysed, ask either for a miracle or for events whose foundation will have to have been laid before I was born, indeed, laid when the universe began. But then to

68. As an extension of this point, consider further that various other passages state that the *thoughts* and *intents* of our hearts will condemn us (see Alma 12:14; 18:32; D&C 88:109). But if God cannot know our future actions with certainty because they are only present potentialities (as incompatibilists assert), it seems likewise reasonable that neither could he also know our thoughts and intents, which also are only present potentialities. In other words, present intents are of the same species as future actions — the latter are the offspring of the former — so an inability to know one ought to imply an inability to know the other. If God cannot *know* potentialities, it seems problematic, then, to use them as legal grounds for condemnation.

God (though not to me) I and the prayer I make in 1945 were *just as much present at the creation of the world as they are now* and will be a million years hence. God's creative act is timeless and timelessly adapted to the 'free' elements within it: but *this timeless adaptation meets our consciousness as a sequence and prayer and answer* ... The event certainly has been decided ... But one of the things taken into account in deciding it, and therefore one of the things that really cause it to happen, may be this very prayer that we are now offering. Thus, shocking as it may sound, I conclude that we can at noon become part causes of an event at ten a.m. (Some scientists would find this easier than popular thought does.)⁶⁹ ... Thus something does really depend on my choice. My free act contributes to the cosmic shape. That contribution is made in eternity or 'before all worlds'; but my consciousness of contributing reaches me at a particular point in the time-series.⁷⁰

Thus, the picture one has who embraces full divine knowledge with genuine agency is one that does not ask if God can know of my actions *before* I choose them but that recognizes that God can know them *as* I choose them. Rather than destroy the authentic joy of novelty, creativity, and surprise that many incompatibilists cherish and strive to preserve, this merely presents the situation as that of a loving parent who feasts on the sight of his or her unknowing child opening a gift that has already been purchased. The hidden beauty of the present, however, is that it "has not *already been* purchased;" it is also purchased *now*. When the gift is God's grace, this means a new future is possible, no matter the path along which we arrive at the present because, even while our "courses are fixed," all human orbits intersect and coexist in the singular moment of Gethsemane. This makes all petitions, decisions, change, and forgiveness possible in a way that does not "rob" timelessness (see Alma 42:25) because, in a poetic sense, Christ is at the crossroads dynamically adapting our path to our choice.

To make sense of this timeless atoning moment, it has been suggested that the simultaneity in Abinadi's words (borrowed from Isaiah) is literal: "*When* his [Christ's] soul has been made an offering for sin he shall *see* his seed" (Mosiah 15:10).⁷¹ Thus, we might imagine that during

69. See discussion of retrocausal theories in footnote 34.

70. Lewis, *Miracles*, 290–92 (emphasis added).

71. See Merrill J. Bateman, "The Power to Heal from Within," *Ensign* 25, no. 5 (May 1995); Tad R. Callister, *The Infinite Atonement* (Salt Lake City: Deseret Book,

those few moments when the Savior — the “Great *I am*” — knelt in Gethsemane, he also entered eternity, seeing and comprehending each of us individually in the totality of our experience, yet in the present. Perhaps in the same way that Moses saw the earth, “he cast his eyes” and “beheld the inhabitants thereof [his seed], and there was not soul which he beheld not; and he discerned them by the Spirit of God” (Moses 1:27–28) affording each of us, according to C.S. Lewis, “infinite attention” while not having to deal with us “in the mass.”⁷²

Finally, the compatibilist view is articulated in another Isaiahic passage that also respects the dual definitions of time even while weaving them together. It also highlights the merciful purposes of the seemingly untenable idea of having certainty regarding action for which the actor is still uncertain. Perhaps its opacity is naively attributable to the fact that it is given by a notoriously cryptic 8th century BC Jew, but we can now see that he is attempting to explain what we have drawn on millennia of philosophy and science to illustrate and yet have concluded is fundamentally an irrational reality. Nephi’s transcription reads:

Behold, I [the Lord] have declared the former things from the beginning; and they went forth out of my mouth, and I showed them. I did show them *suddenly*. And I did it because I knew that thou art obstinate, and thy neck is an iron sinew, and thy brow brass; And I have even from the beginning declared to thee; *before it came to pass I showed them thee*; and I showed them for fear lest thou shouldst say — Mine idol hath done them, and my graven image, and my molten image hath commanded them. Thou hast seen and heard all this; and will ye not declare them? And that I have showed thee new things from this time, *even hidden things*, and thou didst not know them. *They are created now, and not from the beginning*, even before the day when thou heardest them not they were declared unto thee, lest thou shouldst say — Behold I knew them. (1 Nephi 20:3–7)

Isaiah, himself a seer, here ties together several themes relevant from our discussion. Principally, his (accommodated) language supports a compatibilist position inasmuch as it explicitly recognizes both the certainty of the declarations — Jehovah stakes his reputation on them — and that the associated events “are created now [by free human

2000), 140–42.

72. See C.S. Lewis, *Mere Christianity* (New York: HarperOne, 2001), 166–68.

action], and not from the beginning [at the time of their being known and declared].” Moreover, a merciful motivation is revealed: “hidden things” are suddenly and visually foretold that Jehovah might be known, significantly, as the eternally present “I am” and not as merely an extrapolation of our finite capacities, as are our idols.

An Experience

In closing, I give an anecdotal experience from graduate school. During lunch, a group of students would meet to discuss issues in the history and philosophy of science and religion. At these meetings, various professors would direct the group in a reading, discussion, or presentation.

At one particular meeting, around five students showed up to participate. On his laptop, a professor had a very simple computer program. Given the position and velocity of a number of virtual balls in a box, the computer would model their evolution in time. He chose some parameters and started a run. As he introduced the topic, the balls on the screen moved and collided with each other and with the walls of the box. After outlining some of the same thoughts discussed here, he paused the animation and showed a printout of the precise locations and velocities of each of the balls in the simulation. At this point he reversed the motion of each of the balls and continued the simulation, effectively running the system in rewind.

Because of time symmetry in the programming, the expectation was that the balls would all return precisely to their original locations in precisely the same amount of time along precisely the same paths, just as if time flowed backwards. But soon the professor’s message became clear. The balls began to traverse completely different paths than they had previously. Due to the corruption necessarily introduced in storing finite data — an approximation whose error compounds exponentially in systems like this — the ball locations were not just a little off their original values, they were wildly off. Within seconds, time-reversal symmetry was effectively destroyed. Because of tiny imprecisions, the past was very different from the future. The balls never returned to where they started.

As the professor explained this result, the students began to grasp the reality and difficulty of the question: can anyone, including God, really predict the future with any sort of precision? He then suggested God could not know the future with certainty. Because he is bound to participate in time with us, this simulation forced us, it was argued, to take a non-literal interpretation of divine knowledge: God knows the

future only as we do, based on inference from theoretical considerations, and can react to our choices only after they are made.

It was an interesting and impressive demonstration. However, at this point a girl shyly raised her hand and shared an experience. She reported a dream in which she had a memorable conversation with her mother under some fairly unextraordinary circumstances. Upon awaking, she found that within days the experience in her dream was realized in every detail even down to the lace pattern on the drapes. It did not seem this girl shared her experience to challenge the professor but to ask how his model could explain it. The professor gave a standard response in terms of anomalous results in experimental science. However, the impact of the girl's experience was multiplied when a young man then raised his hand and said he had the very same experience, a dream had become actualized in vivid detail some time after having it. If these accounts are authentic and accurate, even if rare, they would pose significant challenges to the thesis that God's omniscience is only figurative, incomplete, unspecific, or limited with regards to the future. As it is, their place in the discussion is uncertain: deeply personal experiences are difficult to rigorously analyze and yet, as opposed to the philosophizing above, they may be the most relevant because they are the most raw.

Perhaps we will never know the true nature of time; perhaps we cannot. In this mortal life, dominated by temporality, it appears to be a basis for achieving understanding and therefore cannot be its object except by the seemingly *atemporal* experience of eternity slicing in to enlighten the mind with a "sudden stroke." If so, although time is a veil that separates us from God, it is a merciful one that protects and prepares as much as it prevents. On the one hand, it permits change, learning, clarity, simplicity, and order, making an active mortal agency possible. On the other, it brings with it a burden to live in the face of incompleteness and decay, requiring faith. With a scientific view, it is exciting to see that the physical mechanisms behind time — coupling and coherence in particular — give a hint, even if only in analogy, as to how natural systems can rise to "put off" these conditions (see Mosiah 3:19). But is it only analogy? Is it mere coincidence that modern revelations center Celestial society so strongly on oneness, exactness, and purity as well (see D&C 38:27; 88:21–22; 97:15–21; Moses 7:18)? Whatever the case, time and eternity are obviously topics on which much remains to be learned, for as we pass through that final veil to enter the highest estate, "time is no longer" (D&C 84:100). The past, present, and future stretch before us as one eternal and wonderful now.

Jared Stenson grew up in Wyoming and Oregon in a large family of artists, musicians, poets, and entrepreneurs. After serving a mission in Madrid, Spain, he realized he wanted to channel his professional energy into a field that, for him, was a very natural outgrowth of this upbringing — theoretical physics. He received a BS and MS from Brigham Young University and went on to complete a PhD at Oregon State University. His research interests lie at the intersection of pedagogy and philosophy with conceptual and theoretical foundational issues in quantum mechanics with a special interest in how humans interact with science. Always with the goal to teach, he currently is an Assistant Teaching Professor at Rice University in Houston and teaches early morning seminary. He and his wife, Stacey, have seven children.

