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Jonathan Edwards and the Language of Nature: The Re-Enchantment of the World in the Age of Scientific Reasoning

For a long time Jonathan Edwards (1703–58) was thought of more as a preacher of hellfire and revival than as a theologian, and rather as a Calvinist theologian than a philosopher of importance, and he was dismissed accordingly. Yet Edwards was more than a hellfire preacher, more than a theologian. This New England divine was one of the rare individuals anywhere to recognize and answer the challenges posed to traditional Christian belief by the emergence of new modes of thought in early modern history — the new ideas of the scientific thought and the Enlightenment. His force of mind is evident in his exposition of the poverty of mechanical philosophy, which radically transformed the traditional Christian dialectic of God's utter transcendence and divine immanence by gradually diminishing divine sovereignty with respect to creation, providence, and redemption, thus leading to the disenchantment of the world. Edwards constructed a teleological and theological alternative to the prevailing mechanistic interpretation of the essential nature of reality, whose ultimate goal was the re-enchantment of the world by reconstituting the glory of God's majestic sovereignty, power, and will within the order of creation.

The whole universe (the soul of man excepted) [is] but a great Automaton, or self-moving engine . . . So that the world being but, as it were, a great piece of clockwork, the naturalist, as such, is but a mechanician.

Robert Boyle, *The Excellency of Theology Compared with Natural Philosophy*, 1665

Hence we learn that there is no such thing as mechanism, if that word is taken to be that whereby bodies act each upon other, purely and properly by themselves.

Edwards, "Of Atoms," c. 1722

[T]o find out the reasons of things in natural philosophy is only to find out the proportion of God's acting.

Edwards, "The Mind," # 34, c. 1725

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I

Jonathan Edwards (1703–58) was perhaps the outstanding theologian and certainly the ablest philosopher to write in America before the great period of Charles S. Peirce (1839–1914), William James (1842–1910), Josiah Royce (1855–1916), and John Dewey (1859–1952). Judged over two centuries, Edwards stands out as one of America's great original minds, one of the very few whose "depiction of reality has known enduring attraction."[1] He is considered as the "foundation stone in the history of American philosophy"[2]; and the unique theology and philosophy he formulated "entitled his to the rank of the greatest American theologian and the greatest American philosopher before the Civil War."[3] Yet Edwards was not only a prominent American intellectual. He was also an important early modern philosopher who developed a singular philosophy of nature, a unique view regarding the essential nature of reality, entitling him to a distinguished place among early modern philosophers — such as Giordano Bruno (1548–1600), the philosopher and mathematician Pierre Gassendi (1592–1655), and Bishop George Berkeley (1685–1753) — who reacted against the metaphysical and theological implications that often accompanied the appearance of new scientific thought and imagination during the sixteenth and seventeenth centuries, traditionally referred to as the scientific revolution.[4] Edwards's natural theology may be examined as well in the context of the reaction by "many guardians of theological orthodoxy" in England against certain trends in contemporary natural philosophy, and their "theologically based suspicions of Newton's work."[5] By examining the unique natural philosophy that Edwards constructed in reaction to new modes of scientific thought and imagination, and by showing his striving to provide a plausible alternative to the predominant scientific reasoning of his time, the present study will attempt to restore Edwards to his due prominence in early modern philosophy.

Edwards formulated the premises of his natural philosophy, or indeed his theology of nature, in a long series of "scientific and philosophical

1. Nathan O. Hatch and Harry S. Stout, "Introduction," in *Jonathan Edwards and the American Experience*, ed. Nathan O. Hatch and Harry S. Stout (New York: Oxford University Press, 1988), 3.
2. Bruce Kuklick, "Jonathan Edwards and American Philosophy," in Hatch and Stout, 246.
3. Elizabeth Flower and Murray G. Murphey, *A History of Philosophy in America*, 2 vols (New York: Capricorn Books, 1977), 1: 137.
4. In recent years historians have begun to question the very concept of *the* Scientific Revolution, and even altogether "to undermine one of our most hallowed explanatory frameworks, that of the Scientific Revolution." See B. J. T. Dobbs, "Newton as Final Cause and First Mover," in *Rethinking the Scientific Revolution*, ed. Margaret J. Osler (Cambridge: Cambridge University Press, 2000), 25, and Richard S. Westfall's rebuttal of Dobbs's thesis in his "The Scientific Revolution Reassessed," in Osler, 41–55; Margaret J. Osler "The Canonical Imperative: Rethinking the Scientific Revolution," in Osler, 3–22, and H. Floris Cohen, *The Scientific Revolution: A Historiographical Inquiry* (Chicago: University of Chicago Press, 1994).
5. Michael Hunter, *Science and Society in Restoration England* (Cambridge: Cambridge University Press, 1981), 187; John Gascoigne, *Cambridge in the Age of the Enlightenment: Science, Religion and Politics from the Restoration to the French Revolution* (Cambridge: Cambridge University Press, 1989), 169, and "From Bentley to the Victorians: The Rise and Fall of British Newtonian Natural Theology," *Science in Context* 2 (1988): 219–56.

writings,"[6] though many references can be found also in other writings and sermons. He composed most of these entries during the 1720s, in attempting to understand the essential nature of reality, or the dimension of the physical and material world within which human life is set. At that time, as he wrote in 1725, his goal was to ascertain God's relation to his creation, and to define the relationship between the order of grace and the order of nature: "The very thing" was to get a clear "knowledge of the manner of God's exerting himself" with respect "of his operations concerning Matter and Bodies."[7]

For a long time Edwards was thought of rather as a preacher of revival and hellfire than as a theologian, and rather as a Calvinist theologian than a philosopher of importance, and he was dismissed accordingly. However, with the possible exception of Benjamin Franklin, Edwards was the most influential and widely read writer of colonial America. This New England divine was one of the rare people anywhere to recognize and face the serious challenges posed to traditional Christian thought and belief by the emergence of new modes of thought in early modern history: the physical discoveries of Newton, the psychological observations of Locke, and the popular acceptance of the Enlightenment belief in "God more kind and man more worthy." Indeed he was almost alone in the eighteenth century in rejecting the idea of the universal moral sense and the essential goodness of the common man, or of "the psychological optimism of the Shaftesbury–Hutcheson gospel of the innate goodness of man."[8] Edwards, then, was more than a revivalist, more than a theologian. He was a bold and independent philosopher who engaged with Enlightenment ideas, attempted to understand the constitution of the natural world and ascertain God's relation to the physical world. Nowhere is his force of mind more evident than in his reaction against the dominant scientific culture and imagination of his time — mechanical philosophy, the doctrine that all natural phenomena can be explained and understood by the mere mechanics of matter and motion — and, consequently, in his quest to provide a meaningful philosophical and theological alternative to the mechanistic explanation of the essential nature of reality, an alternative that reconstituted the glory of God's absolute sovereignty, power, and will within creation.

Edwards began his undergraduate studies at Yale in 1716, and it was there that he first became acquainted with the new scientific ideas coming out of Europe. These theories reached New England as early as the middle of the seventeenth century. "The Copernican theory was known . . . as well as Kepler's work."[9] In the early years of the eighteenth century, Newton's and

6. Edwards, *Works of Jonathan Edwards*, vol. 6, *Scientific and Philosophical Writings*, ed. Wallace E. Anderson (New Haven: Yale University Press, 1980). The most important of these works of natural theology are several tracts on "Natural Philosophy," such as "Of Being," "Of Atoms," and "The Mind."
7. Edwards, "Diary," 12 February 1725, in *Works of Jonathan Edwards*, vol. 16, *Letters and Personal Writings*, ed. George S. Claghorn (New Haven: Yale University Press, 1998), 787.
8. Norman Fiering, *Jonathan Edwards's Moral Thought and Its British Context* (Chapel Hill: University of North Carolina Press, 1981), 148.
9. Flower and Murphey, 1: 62.

Locke's writings gradually found their way into New England and transformed the curriculum at Harvard and Yale. With the modernization of the Yale curriculum during the year 1717–18,[10] Edwards encountered the new modes of scientific reasoning and the novel ideas of the early Enlightenment, which he saw as tending "to diminish divine sovereignty in respect of creation, providence, and redemption and to enhance human independence, producing by degrees an estimate of mankind more morally capable and of God more benevolent."[11] For the rest of his life, the dialogue with these early modern intellectual movements was an inseparable part of his entire philosophical and theological enterprise.[12] More specifically, Edwards's attempt to provide a serious and systematic response to the challenges posed by mechanical philosophy to traditional Christian thought and belief established him as one of the most acute critics of current dominant scientific thought and imagination. This is particularly evident in his long series of writings on natural philosophy, composed during the 1720s, where he strove to construct a theology or a typology of nature, and hence of the essential nature of reality, in opposition to the mechanistic interpretation of nature that had become the predominant mode of scientific thought.

The significance of Edwards's response to the metaphysical and theological principles that often accompanied mechanical philosophy should be seen in the wider intellectual context of colonial New England. He was almost alone in British America in taking upon himself the mission of responding to the grave challenges posed to traditional religious faith and belief by the new culture of time and space inaugurated by mechanical philosophy.[13] Indeed, among contemporaries, he was alone in his "pursuit of reality," attempting to understand the "constitution of the natural world" and ascertain "God's relationship to his physical creation."[14] Fully aware of the grave ramifications inherent in the premises of mechanical philosophy as they affected the traditional Christian dialectic of God's transcendence and divine immanence, Edwards recognized that the new scientific interpretation was leading increasingly to the disenchantment of the world,[15] the growing separation between

10. Wallace E. Anderson, "Introduction," *Works of Jonathan Edwards*, vol. 6, *Scientific and Philosophical Writings*, 15; Flower and Murphey, 1: 81–3.

11. William K. B. Stoever, "The Calvinist Theological Tradition," in *Encyclopedia of American Religious Experience*, ed. C. H. Lippy and P. W. Williams, 3 vols (New York: Charles Scribner's Sons, 1988), 2: 1044.

12. For Edwards's list of reading, which reflects his participation in the new scientific world view of the Enlightenment, see "Jonathan Edwards's Reading 'Catalogue' with Notes and Index," ed. L. Brian Sullivan, Works of Jonathan Edwards office, Yale Divinity School, New Haven, Connecticut.

13. The various meanings of the term "mechanical" in seventeenth-century thought are discussed in J. E. McGuire, "Boyle's Conception of Nature," *Journal of the History of Ideas* 33 (1972): 523, n. 2.

14. Wilson H. Kimnach, "Jonathan Edwards's Pursuit of Reality" in Hatch and Stout, 102–4.

15. Max Weber argued that the origin of this process of the disenchantment of the world should be traced back to the Protestant Reformation, which brought about "the elimination of magic from the world." See Max Weber, *The Protestant Ethic and the Spirit of Capitalism* (London: Routledge, 1995 [1904]), 105. Modern studies today rather tend to see the beginning of the disenchantment of the world, or the separation of the order of grace and the order of nature, with the "nominalist revolution," of the fourteenth century. See Amos Funkenstein, *Theology and the*

the order of grace and the order of nature,[16] God and the world, and was thus incompatible with traditional Christian belief.

Edwards fully grasped the serious challenges posed by mechanical philosophy to religious modes of faith and experience. He was alarmed by the mechanistic conception of the world of nature as a self-contained and independent reality, a self-inclusive machine running by itself according to abstract, universal laws of nature, freed from subordination to God's dominion and not affected by His unceasing watchful eyes. With great dismay he observed that mechanical philosophy's notion of a homogeneous, uniform and symmetrical, one-dimensional world of nature, not only deprived created order of any teleological ends and purposes, but stipulated that nature could no longer manifest the presence of God. In response Edwards constructed his own theology of nature, or typology — interpreting the physical world as a representation or a "shadow" of the spiritual which celebrates God's glory and sovereignty as they are evidenced in the coherence and beauty, order and harmony, of world phenomena.

While undertaking to provide an alternative view of the essence of reality which would lead eventually to the re-enchantment of the world, Edwards's ultimate goal was the demonstration of the infinite power of God's absolute sovereignty in both the "order of nature" and the "order of time."[17] For him the challenge of the new scientific theories was "not atheism but the gradual elimination of God's special providence."[18] Edwards's interpretation of natural phenomena therefore constituted a radical departure from the prevailing mechanical philosophy. Believing "the corporeal world is to no advantage but to the spiritual," he claimed that "to find out the reasons of things in natural philosophy is only to find out the proportion of God's acting."[19] In this venture of the re-enchantment of the world, Edwards was not alone in the British world, as can be seen in the close affinities between his thought and

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Scientific Imagination from the Middle Ages to the Seventeenth Century (Princeton: Princeton University Press, 1986), 27; Alexandre Koyré, *From the Closed World to the Infinite Universe* (New York: Harper Torchbooks, 1958), 5–27; Louis Dupré, *Passage to Modernity: An Essay in Hermeneutics of Nature and Culture* (New Haven: Yale University Press, 1993), 167–89. See also Gordon Leff, *The Dissolution of the Medieval Outlook* (New York: Harper Torchbooks, 1976), 36–58.

16. For various theological attempts to define the separation between the order of grace and the order of nature along with its ramifications regarding the issue of modernity, see Louis Dupré's important studies, *Passage to Modernity*, "The Dissolution of the Union of Nature and Grace at the Dawn of the Modern Age," *The Theology of Wolfhart Pannenberg*, ed. Carl E. Braaten and Philip Clayton (Minneapolis: Augsburg Publishing House, 1988), 95–121, and "Nature and Grace: Fateful Separation and Attempted Reunion," *Catholicism and Secularization in America*, ed. David L. Schindler (Huntington, Ind.: Our Sunday Visitor Publishing Division, 1990), 52–73.

17. Edwards, *Miscellany* # 704 (c. 1736), in the *Miscellanies*, typescript on disk, Works of Jonathan Edwards office, Yale Divinity School, New Haven, Connecticut; Edwards, *Freedom of the Will*, 1754, *Works of Jonathan Edwards*, vol. 1, ed. Paul Ramsey (New Haven: Yale University Press, 1957), 177.

18. James Hoopes, "Jonathan Edwards's Religious Psychology," *The Journal of American History* 69 (1983): 863

19. Edwards, "The Mind," *Works of Jonathan Edwards*, vol. 6, *Scientific and Philosophical Writings*, 353–5.

that of other anti-Newtonians at that time, such as Berkeley and the poet William Blake.[20]

The genesis of Edwards's construction of the theology of nature can be found in his conversion experience which took place in 1721, when he was seventeen years old.[21] This spiritual experience radically transformed his entire existential condition; he had found "God's absolute sovereignty" over the entire order of creation, and this conviction, he declared, "is what my mind seems to rest assured of, as much as of any thing that I see with my eyes."[22] More specifically, the experience of conversion crucially informed both the creation of Edwards's theology of nature and its content and form, leading directly to his enterprise of reconstructing the whole created order, or the entire material world, according to his newly acquired religious convictions and persuasions. Thus, equipped with a new knowledge of his religious identity, Edwards developed a new sense of his existential condition within a close-knit divine universe, in which "God's excellency, his wisdom, his purity and love, seemed to appear in every thing."[23] An impressive outpouring of writings on "Natural Philosophy" followed in which the young man tried to convert the world around him and to reconstruct it according to his newly gained religious convictions and theological persuasions. As these writings clearly show, Edwards's interpretation of the essential nature of reality constituted a serious and systematic attempt to provide a meaningful alternative to the growth of new modes of thought in early modern Europe that countered traditional Christian thought and belief.

In his works on "Natural Philosophy," Edwards constructed a singular natural philosophy, or indeed theology of nature, according to which the material world of everyday life was only the manifestation of a divine universe, wonderfully made and harmonized according to God's will and design. Everything in the physical realm seemed to him to have a specific part and role in a well-designed and close-knit divine universe ruled directly and immediately by God's absolute sovereignty: "And very much of the wisdom of God in the creation appears in his so ordering things natural, that they livelily represent things divine and spiritual."[24] Given the world of nature

20. Edwards's criticism of mechanical philosophy may be considered in the wider context of British anti-Newtonians, such as George Berkeley (1685–1753), William Blake (1757–1827), and others, who opposed to distancing God from the phenomena of nature, or detaching the order of grace from the order of nature, as Newton's universal active principles appeared to do. Berkeley and Edwards developed independently their "idealism," or the view that physical objects exist only in the mind or cannot exist until they are perceived. Both evidently ran the risk of emptying nature of any intrinsic structure and principles of its own. For a comparison of their views, see Christopher Kaiser, *Creation and the History of Science* (Grand Rapids: Eerdmans, 1991), 244–53; Anderson, "Introduction," 102–3.

21. For an analysis of Edwards's morphology of conversion, and the centrality of the conversion moment in the formation of his philosophical theology, see Avihu Zakai, "The Conversion of Jonathan Edwards," *Journal of Presbyterian History* 76(1) (1998): 1–12.

22. Edwards, "Personal Narrative," in *Works of Jonathan Edwards*, vol. 16, *Letters and Personal Writings*, 792.

23. Edwards, 793–4.

24. Edwards, *Miscellany* # 119 (c. 1724), *Works of Jonathan Edwards*, vol. 13, *The "Miscellanies": Entry Nos. a–z, aa–zz, 1–500*, ed. Thomas A. Schafer (New Haven: Yale University Press, 1994), 184.

conceived as totally dependent upon God's power and will, it was obviously an integral part of the grand teleological and theological structure of order inherent in the universe and God's cosmic providential plan. As Edwards argued in 1723, "Every atom in the universe is managed by Christ so as to be most to the advantage of the Christian, every particle of air or every ray of the sun."[25]

Edwards developed his cosmological conception of real being and true substance in order, in part, to refute materialism. He rejected Hobbes's materialism, which held that the universe is a complete, autonomous, and self-sustaining system of unthinking bodies subject only to inherent, necessary, and mathematically exact laws of mechanical causation, because it ruled out the divine and providential government of the world. Instead of "Hobbes' notion" that "all substance is matter,"[26] Edwards objected, "the world exists only mentally."[27] Therefore "those beings which have knowledge and consciousness are the only proper and real and substantial beings . . . [hence] spirits only are properly substance."[28] In his reaction to materialism, Edwards formulated his own idealistic phenomenalism, the thesis that physical objects exist only in the mind or cannot exist unless they are perceived: "the world, i.e. the material universe, exists nowhere but in the mind," and given that "all material existence is only idea," the "world therefore is an ideal one."[29]

Edwards's conversion experience dictated a program of work that required, in part, an interpretation of nature in harmony with his profound new theological convictions. "The very thing I now want," he wrote in his "Diary" in 1725, is to get "a clearer and more immediate view of the perfections and glory of God," both in regard of "the manner of God's exerting himself, with respect to Spirits and Mind," and of the Deity's "operations concerning Matter and Bodies."[30] With such a mission in hand, Edwards found that the contemporary dominant scientific understanding of the nature of reality was incompatible with his religious persuasions. Accordingly, aiming to re-define natural phenomena in order to prove God's sovereign majesty within the created world, he attacked mechanical philosophy, claiming in 1722, "there is no such thing as mechanism, if that word" meant that "bodies act each upon other, purely and properly by themselves,"[31] because "the very being, and the manner of being, and the whole of bodies depends immediately on the divine power."[32]

25. Edwards, *Miscellany # ff* (c. 1723), 184.
26. Edwards, "Things to be Considered an[d] Written fully about" (c. 1722–4), *Works of Jonathan Edwards*, vol. 6, *Scientific and Philosophical Writings*, 235.
27. Edwards, *Miscellany* # 247 (c. 1726), 360.
28. Edwards, "Of Being," *Works of Jonathan Edwards*, vol. 6, *Scientific and Philosophical Writings*, 207.
29. Edwards, "The Mind," 350–6.
30. Edwards, "Diary," 12 February 1725, 787.
31. Edwards, "Of Atoms," *Works of Jonathan Edwards*, vol. 6, *Scientific and Philosophical Writings*, 216.
32. Edwards, "Things to be Considered," 235.

II

The mechanistic conception of nature was responsible for the emergence of a new culture of time and space which played a great part in the desacralization of the world. In the face of this process of the desacralization of the world, the English churchman John Edwards complained in the 1690s that the new scientific theories were leading to the exclusion of religious considerations: "Learned Enquirers are apt to give Encouragement to Atheism by *an obstinate endeavouring to solve all the* Phenomena *in the world by mere Natural and Corporeal Causes*, and by their averseness to admit of the aid and concurrence of a Supernatural and Immaterial Principle for the production of them."[33] In a similar vein the nonjuror George Hicks claimed: "It is their Newtonian philosophy which hath Made Not only so many Arians but Theists, and that Not only among the laity but I fear among the divines."[34] By the early eighteenth century, then, "many guardians of theological orthodoxy" found "the danger in mechanical philosophy," and "Newtonians like Samuel Clarke were pilloried for abetting the growth of heretical ideas."[35]

The emergence of new scientific ideas thus radically influenced the relationship between reason and revelation, between the light of nature and God's Word. From the early eighteenth century, "the concept of nature as an inherently active substance was developed explicitly in opposition to the Newtonian concept of nature." In contrast to "Newton's doctrine that all causal activity in nature was imposed by God's power and will," a new "theory of nature" emerged "in which activity was considered as immanent in the structure of nature"; hence "nature was endowed with intrinsic active forces or powers."[36] Further, according to the mechanistic interpretation, after God created the world he set it in motion and regulated it by laws of nature which may be formulated in mathematical terms, and these laws can be discerned by the light of nature and not solely through God's Word.[37] The mechanistic image of nature evidently has nothing to do with divine revelation, but rather everything with reason: "reason now becomes" the "first ground of all knowledge and the guideline of the determination of the things."[38] Revelation, as the mechanical philosopher and the "great father figure of British natural philosophy in his time,"[39] Robert Boyle, wrote, is "a foreign principle in this *philosophical enquiry*" of natural philosophy, therefore the latter should be based only upon "the light of reason."[40] Mechanical philosophy was founded upon rationalism,

33. Hunter, 170.
34. Gascoigne, *Cambridge in the Age of the Enlightenment*, 164.
35. Hunter, 187.
36. P. M. Heimann, "Voluntarism and Immanence: Conceptions of Nature in Eighteenth-Century Thought," *Journal of the History of Ideas* 39 (1978): 275–6.
37. For an important discussion of the shift in philosophical and theological perspective regarding the concept of the laws of nature, see Francis Oakley, "Christian Theology and the Newtonian Science: The Rise of the Concept of the Laws of Nature," *Church History* 30 (1961): 433–57.
38. Martin Heidegger, "Modern Science, Metaphysics, and Mathematics," in Martin Heidegger, *Basic Writings*, ed. David F. Krell (New York: HarperCollins, 1993), 304.
39. McGuire, "Boyle's Conception of Nature", 524.
40. Robert Boyle, *A Free Enquiry into the Vulgarly Received Notion of Nature*, 1686, in *Selected Philosophical Papers of Robert Boyle*, edited with an introduction, M. A. Stewart (Indianapolis: Hackett, 1991), 189.

that is, the view that "nature operates according to mechanical principles, the regularity of which can be described in the form of natural laws, ideally formulated in mathematical terms."[41] This was indeed what Newton attempted to do in his *Philosophiae Naturalis Principia Mathematica* (Mathematical Principles of Natural Philosophy), 1687, writing that he offered "this work as the mathematical principle" of natural "philosophy, for the whole burden of philosophy seems to consist in this — from the phenomena of motion to investigate the forces of nature, and then from these forces to demonstrate the other phenomena."[42] Accordingly, continued Newton, "I wish we could derive the rest of the phenomena of Nature by the same kind of reasoning from mechanical principles."[43]

In the new scientific thought, knowledge of the mysteries of world phenomena was gradually divorced from divine revelation; instead, "an independent and original truth of nature" emerged. "This truth is revealed not in God's word but in his works; it is not based on the testimony of Scripture or traditions but is visible to us all the time. But it is understandable only to those who know nature's handwriting and can decipher her text."[44] Newton argued that a true understanding of the phenomena of nature is based upon "rational mechanics," or "reasoning from mechanical principles" on all "the phenomena of Nature" which are formulated according to "mathematical principles."[45] Contrary to revelation, in the realm of nature "the whole plan of the universe lies before us in its undivided and inviolable unity, evidently, waiting for the human mind to recognize and express it."[46]

Here lay the sources, in part, of the Enlightenment belief in human autonomy. The "Enlightenment," wrote Paul Tillich, "was one of the greatest of all revolutions." It was "the revolution of man's autonomous potentialities over against heteronomous powers which were no longer convincing."[47] Included among such powers was the "authority of the Christian church and of its dogma and ultimately the objective authority of Scripture and of transcendent revelation itself."[48] In sum, with the new scientific ideas and the Enlightenment's new modes of thinking regarding human beings' ability to understand the world of nature in which their lives are placed, the capacity of religious faith and belief to provide objective truths about the essential nature of reality underwent a crucial transformation.

41. John H. Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge: Cambridge University Press, 1991), 119.
42. Isaac Newton, "Newton's Preface to the First Edition," 1686, in *Sir Isaac Newton's Mathematical Principles of Natural Philosophy and His System of the World*, ed. Florian Cajori, 2 vols (Berkeley and Los Angeles: University of California Press, 1934), 1: xvii.
43. Isaac Newton, "Newton's Preface to the First Edition of the *Principia*," in *Newton's Philosophy of Nature: Selections from His Writings*, ed. H. S. Thayer (New York: Hafner, 1974), 9.
44. E. Cassirer, *The Philosophy of the Enlightenment* (Boston: Beacon Press, 1962 [1932]), 42–3.
45. Newton, "Newton's Preface to the First Edition," xvii–xviii.
46. Cassirer, 43.
47. Paul Tillich, *A History of Christian Thought: From Its Judaic and Hellenistic Origins to Existentialism*, ed. Carl. E. Braaten (New York: Simon & Schuster, 1968), 323.
48. Jaroslav Pelikan, *The Christian Tradition: A History of the Development of Doctrine*, 5 vols (Chicago: University of Chicago Press, 1971–89), vol. 5, *Christian Doctrine and Modern Culture (Since 1700)*, 60.

III

Edwards launched his critique of the metaphysical and theological premises of the mechanical philosophy of nature with a discussion of atoms, because an atom is a "*minimum physicum*,"[49] that is, the smallest physical particle in the universe; understanding it may lead to a better knowledge of the mysteries of the whole material world. He began with the issue of the atomic doctrine because by the end of the seventeenth century "atomism as a mechanical philosophy was, in England, the conservative view."[50] Indeed, in his determination to establish God's sovereignty and activity in the world, Edwards appropriated the prevailing atomic doctrine, given that it was the available scientific language of his time, but he radically Christianized it in his desire to show how closely and intimately God's divine activity controls and directs even the smallest particles of atoms. "All bodies whatsoever," he wrote, in accordance with contemporary atomic doctrine, "must of absolute necessity be composed of atoms, or bodies that are indiscerpible [*sic*], that can not be made less, or whose parts cannot by any finite power whatsoever, be separated one from another."[51] Edwards's purpose was not only to define the "ontological status of bodies and their immediate dependence upon God's power and will,"[52] but also to demonstrate the infinite power of divine activity in the world through the agency of the very smallest physical particle of nature, and thus to show that it is "God himself, or the immediate exercise of his power, which keeps the parts of atoms" or bodies "together."[53] Believing in "the doctrine of God's absolute sovereignty in the moral and spiritual world,"[54] Edwards transposed this spiritual experience into the physical world, claiming that in the material world "all body" or matter "is nothing but what immediately results from the exercise of divine power." Hence the ontological status of tangible, material bodies is radically dependent on God, and "the constant exercise of the infinite power of God is necessary to preserve bodies in being."[55] His radical claim that every "atom in the universe is managed by Christ"[56] should also be understood in this wider metaphysical and theological context. Given that the being and existence of everything in creation stands under the constant and immediate absolute power and will of God, the whole world of nature is imbued with God's redemptive activity. Hence, argued Edwards, "It is exceeding evident in natural philosophy, that all the operations of the creatures are the immediate influence of the divine being."[57]

The argument of God's immediate influence in controlling and regulating every atom, and hence the operation of all tangible, material bodies in the

49. Edwards, "Of Atoms," 212.
50. Robert H. Kargon, *Atomism in England from Hariot to Newton* (Oxford: Clarendon Press, 1966), 133; Hunter, 173.
51. Edwards, "Of Atoms," 208.
52. Anderson, "Introduction," 68.
53. Edwards, "Of Atoms," 214.
54. Anderson, "Introduction," 26.
55. Edwards, "Of Atoms," 215, 214.
56. Edwards, *Miscellany # ff* (c. 1723), 184.
57. Edwards, *Miscellany #* 178 (1725), 327.

universe, enabled Edwards to reject mechanical philosophy's claim that natural phenomena can be explained by the mere mechanics of matter and its motion, or that, as Boyle wrote, "the phenomena of the world" are "physically produced by the mechanical affections of the part of matter, and what they operate upon one another according to mechanical laws."[58] Against this, Edwards argued that because atoms are totally and absolutely dependent on God's infinite power, the very framework of the material universe is evidence of God's omnipresence, omnipotence, and omniactivity: "the very being, and the manner of being, and the whole of bodies depends immediately on the divine power."[59]

In *Original Sin* (1758) Edwards reiterated these views, claiming that "the existence of created substance" is "the effect of God's immediate power, in that moment, without any dependence on prior existence, as much as the first creation out of nothing."[60] The understanding of the physical, material world thus abandoned the scientific, mechanistic image of a huge machine, set going by a perfect watchmaker and regulated by mere natural laws, for the sake of a universe pervaded with divine activity where God's infinite power is manifested in creating and sustaining the world anew at every moment through the agency of atoms.

Edwards's interpretation of the essential nature of reality contradicted some important implications that mechanical philosophers had drawn from the atomic doctrine. Hobbes said that all "gross bodies are composed of small invisible subtle bodies" or atoms "whose varieties of motion accounted for the various physical qualities to be found in nature." Because "motion cannot be understood to have any other cause besides motion," all natural phenomena have no "other cause than motion."[61] Edwards, however, asserted that "it is God himself," through "the immediate exercise of his power, that keeps the parts of atoms together" and preserves "bodies in being." Hence "all body is nothing but what immediately results from the exercise of divine power in such a particular manner," and thus, ultimately, all "motion" of bodies "is from the immediate exercise of divine power."[62] Striving to proclaim divine activity in the world, Edwards declared that only "infinite power," or God himself, "keeps the parts of atoms together."[63] A similar view can be found in Newton's *Opticks*, 1704, where he wrote concerning "Particles" of matter, or atoms, that "no ordinary Power" is able "to divide what God hisself" made "in the first Creation."[64] The difference between them, however, is crucial; for Newton atoms were *made* in creation, while for Edwards God continues

58. Robert Boyle, *About the Excellency and Grounds of the Mechanical Hypothesis*, 1674, in *Selected Philosophical Papers of Robert Boyle*, 139.
59. Edwards, "Things to be Considered," 235.
60. Edwards, *Works of Jonathan Edwards*, vol. 3, *Original Sin*, 1758, ed. Clyde A. Holbrook (New Haven: Yale University Press, 1970), 402.
61. Kargon, 57, 59.
62. Edwards, "Of Atoms," 214–16.
63. Edwards, 214.
64. Isaac Newton, *Opticks, or A Treatise of the Reflections, Refractions, Inflections & Colours of Light*, 1704, ed. Bernard Cohen (New York: Dover, 1952), 400.

to keep, control, and continuously regulate the atoms "throughout all eternity."[65] Thus, Edwards can say that "the universe is created out of nothing every moment."[66]

Edwards's atom, or that smallest particle which is indivisible and "whose parts cannot by any finite power" be "separated one from another,"[67] serves an important metaphysical and theological purpose: it is the agent by which God exercises his infinite power and the medium through which his immanence is realized within creation. Edwards went further than Newton. He asserted that the "nature of atoms" is "an infinite power," so that "all the nature of them that is not absolutely themselves must be God exerting his power upon them."[68] God not only created atoms during the moment of creation, but continuously and immediately exerts his influence on them: "'Tis certain that when God first created matter or the various chaoses of atoms . . . he designed the figures and shapes of every atom, and likewise their place." Hence, to avoid a situation where "the least wrong step in a mote may, in eternity, subvert the order of the universe," Edwards praised "the great wisdom of God" in disposing "every atom at first, as that they should go for the best throughout all eternity."[69] What arises, then, from his concept of atoms as a metaphysical-theological principle, is a universe structured according to a grand teleological and theological order in which God becomes the sole foundation of all natural phenomena: through the agency of the atom, his absolute sovereignty is established; and divine omnipotence, omnipresence and omniscience are affirmed by the smallest particle in the universe, thus securing divine immanence in creation. The world of nature could not be regarded as founded upon mechanistic causes and effects but was totally dependent on God's power and will.

The attempt to establish God's sovereignty through the agency of atoms was not Edwards's alone. Such a doctrine was first formulated by the Italian philosopher Giordano Bruno (1548–1600), according to whom "God becomes the source of all change in nature, as well as the source of its existence" via the agency of the atom.[70] Both Bruno and Edwards used the atomic doctrine to enhance nature's dependence on God's will and power. Yet there are many differences between Bruno's conception of the atom and that of Edwards. In Bruno's thought the number of atoms is infinite because "matter is infinite" and the world as a whole is infinite, whereas Edwards believed that the number of atoms is finite because they are part of a finite and closed universe. (In order to secure God's absolute sovereignty in creation, and the created order's total dependence on God, Edwards rejected the notion of an infinite universe, saying that only in "the ecstasy of the imagination" could one

65. Edwards, "Things to be Considered," 231.
66. Edwards, 241.
67. Edwards, "Of Atoms," 208.
68. Edwards, 214.
69. Edwards, "Things to be Considered," 265, 231. A similar contention can be found in modern chaos theory regarding the "butterfly effect."
70. Robert H. Kargon, "Atomism in the Seventeenth Century," *Dictionary of the History of Ideas*, ed. Philip P. Wiener, 5 vols (New York: Scribner, 1973), 1: 133.

"pronounce the world infinite."[71]) Bruno argued that the "source of an atom's motion is not to be sought in another atom," but rather the "atom is a center of life, a point in which the soul of the universe is inserted. Co-eternal with God, matter is not a pre-existent chaos" nor "was it created in time," hence "it is located outside the temporal." And although matter can not be "identified with God," it is nevertheless "close to God."[72] Edwards, of course, would not accept the co-eternality of matter with God or that matter exists outside the temporal dimension of time. For his atoms are created and not eternal, hence their essence and being are entirely dependent on God. Despite these differences, however, there are many similarities between Bruno and Edwards. Both argued that through the agency of atoms God is the source of all natural phenomena, and they both believed that the atom's motion stemmed from God and not from natural, mechanistic causes. Thus, in Edwards the cause of "motion" is "from the immediate exercise of divine power."[73]

Edwards's views on atomism have many affinities as well with the ideas of the French philosopher and mathematician Pierre Gassendi (1592–1655), who attempted to Christianize the classical atomist doctrine of Epicurus and Lucretius by arguing that God directs the atoms.[74] The resemblance between Gassendi's and Edwards's views regarding God's direct control of the atom is striking; both hold that atoms are created rather than eternal as in Epicurus or in Bruno; both argued that atoms are not infinite in number, as Bruno thought, but rather part of a finite universe, and, finally, both believed that atoms are an integral part of the created universe constructed by God to fulfill His redemptive purposes. Moreover, against the mechanical philosophers' concept of motion inherent in matter, Gassendi, and later Edwards, asserted that the motion of atoms was instilled in them by God at creation. The "individual atoms," said Gassendi, "received from God as he created them their corpulence, or dimensions, however small, and their shapes in ineffable variety, and likewise they received the capacity (*vis*) requisite to moving, to imparting motion to others, to rolling about . . . to leap away, to knock against

71. Edwards, "Of the Prejudices of Imagination," 1722, *Works of Jonathan Edwards*, vol. 6, *Scientific and Philosophical Writings*, 197.

72. Paul H. Michel, *The Cosmology of Giordano Bruno*, trans. R. E. W. Madison (Ithaca: Cornell University Press, 1973), 147–9. On Bruno's life and thought, see Dorothea W. Singer, *Giordano Bruno: His Life and Thought* (New York: Greenwood, 1968.) This book contains a translation of Bruno's work *On the Infinite Universe and World*, 1584. See also Giordano Bruno, *Cause, Principle, and Unity: Five Dialogues by Giordano Bruno*, trans. Jack Lindsay (Westport, Conn.: Greenwood, 1962). On Bruno's materialism, see Frederick A. Lange, *The History of Materialism: And Criticism of its Present Importance* (London: Paul Kegan, 1925), 232–6.

73. Edwards, "Of Atoms," 214–16.

74. Edwards read Gassendi's *Institutio Astronomica* (London, 1653), and Gassendi's attack on Descartes in the *Disquisitio metaphysica anti-Cartesians* (Metaphysical colloquy, or doubts and rebuttals concerning the metaphysics of René Descartes), 1644, during his senior year at Yale. See Anderson, "Introduction," 12–13, 21–2. It is not clear, however, whether Edwards indeed read the *Syntagma Philosophicum* (A philosophical compendium) of 1658 where Gassendi elaborated his modernized atomic theory. On Gassendi's life and thought, see Osler, *Divine Will and the Mechanical Philosophy*; Lynn Sumida Joy, *Gassendi the Atomist: Advocate of History in an Age of Science* (Cambridge: Cambridge University Press, 1987); Barry Brundell, *Pierre Gassendi: From Aristotelianism to a New Natural Philosophy* (Dordrecht: D. Reidel, 1987); and Lisa T. Sarasohn, *Gassendi's Ethics: Freedom in a Mechanistic Universe* (Ithaca: Cornell University Press, 1996).

other atoms," etc.[75] In Edwards, not only "the exercising of the infinite power of God is necessary to keep the parts of atoms together," but "motion also, which is the communication of body, solidity, or this resistance from one part of space to another successively . . . is from the immediate exercise of divine power."[76] Edwards departed from even Gassendi's views when he went on to claim that it is in fact Christ who directs all the atoms in the universe — "Every atom in the universe is managed by Christ so as to be most to the advantage of the Christian"[77] — thus completely Christianizing the atomic doctrine of mechanical philosophy.

In his reaction against mechanical philosophy, Edwards used the atomic doctrine to advance his fundamental theological convictions, and by Christianizing atomism he sought to present it as evidence of the created order's dependence on God. The mechanistic atomic doctrine thus underwent a radical transformation. Whereas the "ancient atomists had made motion an inherent property of matter; hence, a Godless universe could exist and subsist,"[78] Edwards denied any inherent qualities to matter except solidity, and through the agency of the atom he claimed divine immanence in creation.

IV

Opposition to the metaphysical and theological premises that often accompanied the atomic doctrine constituted only part of Edwards's general antagonism to mechanical philosophy, especially with regard to the mechanistic image of the world as a huge machine, and the concepts of "laws of nature" and of God's relation with his creation. The mechanization of the natural world was of course an important feature of late-seventeenth-century science. Its "basic postulate was that nature operates according to mechanical principles, the regularity of which can be expressed in the form of natural laws."[79] Mechanical philosophers conceived of the world as a machine, "a world machine," which runs like a clockwork according to the mechanical laws of nature.

The view that nature is operated by secondary causes or natural laws, setting an intermediate realm between God and the created order, was unacceptable to Edwards because it radically reduced divine immanence and redemptive

75. Pierre Gassendi, "The Syntagma: Physics," 1658, in *The Selected Works of Pierre Gassendi*, ed. and trans. Graig B. Brush (New York: Johnson Reprint Corporation, 1972), 400. An excellent discussion of Gassendi's atomism can be found in Osler, *Divine Will and the Mechanical Philosophy*, 180–200.
76. Edwards, "Of Atoms," 214–16.
77. Edwards, *Miscellany # ff* (1722), 184.
78. Robert Kargon, "Introduction," *Physiologia Epicuro-Gassendo-Charltoniana: Or A Fabric of Science Natural, upon the Hypothesis of Atoms . . . by Walter Charleton*, 1654, ed. Robert H. Kargon (New York: Johnson Reprint Corporation, 1966), xiii.
79. Brooke, 117, 119. On mechanical philosophy of nature, see also Richard S. Westfall, *The Construction of Modern Science: Mechanisms and Mechanics* (Cambridge: Cambridge University Press, 1977 [1971]), *Force in Newton's Physics: The Science of Dynamics in the Seventeenth Century* (London: Macdonald, 1971); and Margaret C. Jacob, *The Cultural Meaning of the Scientific Revolution* (New York: Alfred A. Knopf, 1988).

activity and placed severe limitations on God's sovereignty. He argued that there is "no such thing as mechanism,"[80] because the phenomena of the world cannot be explained by the mechanics of matter and motion alone, but should be understood in the light of higher ends. The mechanistic image of the world should be totally rejected because "if the highest end of every part of a clock is only mutually to assist the other parts in their motions, that clock is good for nothing at all." The analogy from this to the world is not hard to discern; however "useful all the parts of the world are to each other, if that be their highest end, the world in general is altogether useless." Seen in this teleological and theological context the mechanistic concept of the world as a vast machine has no warrant whatsoever: "it is nonsense to say of a machine whose highest end is to have one part move another; for the whole is useless, and so every part, however they correspond."[81] Instead "the corporeal world is to no advantage but to the spiritual."[82] Religion, therefore, should be the main interpreter of world phenomena: "The Book of Scripture is the interpreter of the book of nature," by illuminating "those spiritual mysteries" that are "signified or typified in the constitution of the natural world."[83] Believing that the main function of the world of matter and motion, being ontologically inferior and subordinated to a higher divine reality, is to reflect the images and shadows of spiritual reality beyond and above it, Edwards claimed that the "whole outward creation, which is but the shadows of beings, is so made to represent spiritual things,"[84] or, conversely, that "the things of the world are ordered [and] designed to shadow forth spiritual things."[85] Here lay the ultimate role he assigned to religion in explaining the world of nature: where the "glories of astronomy and natural philosophy consist in the harmony of the parts of the corporeal shadow of a world; the glories of religion consist in the sweet harmony of the greater and more real worlds with themselves, with one another and with the infinite fountain and original of them."[86]

Rejecting the mechanization of the world was part of Edwards's strong reaction against the mechanical conception of "natural laws." By rejecting the classical and medieval notion of nature as an organic being, or an organism of active bodies, and denying the created order any contribution to or participation in God's providential plan, mechanical philosophy denied the possibility of divine immanence in nature. The divine presence in mechanistic philosophy was thus confined to the construction of a system of external, abstract laws which could be formulated in mathematical terms, such as the laws of motion or the laws of gravity, which govern the world's phenomena. God, argued Boyle, "established *rules of motion*, and that order amongst

80. Edwards, "Of Atoms," 216.
81. Edwards, *Miscellany* # *tt* (1723), 190.
82. Edwards, "The Mind," 353–5.
83. Edwards, "Images of Divine Things" # 156 (1743), *Works of Jonathan Edwards*, vol. 11, *Typological Writings*, ed. Wallace E. Anderson and Mason I. Lowance, Jr (New Haven: Yale University Press, 1993), 106.
84. Edwards, *Miscellany* # 362 (c. 1728), 434.
85. Edwards, "Images of Divine Things" # 7 (1728), 53.
86. Edwards, *Miscellany* # 42 (1723), 224.

things corporal, which we are wont to call the *laws of nature*."[87] The mechanization of the natural world led therefore to the mechanization of God's providential activity in the world. Once set going by God, the course of nature and the phenomena of the world are the product of mere mechanical laws and no longer manifest the divine immanence. God's providential scheme, then, was confined mainly to the establishment and maintaining of the general, external laws of nature which regulate the world phenomena. Thus, for example, Newton's God is a cosmic legislator, "a Universal Ruler,"[88] who, as he wrote in a letter to Richard Bentley in 1693, is "an agent acting constantly according to certain laws."[89] Exactly on this point Leibniz "chides Newton and his followers for reducing God to the status of an inferior maker/repairman" of the universe.[90]

Edwards could not accept such a radical reduction of divine power which obviously tended to diminish God's absolute sovereignty. Against the mechanical philosophers' assertion that "divine operation" is "limited by what we call LAWS OF NATURE," he declared that it is unwarranted to use such a concept to describe God's relation with the order of creation. For what is implied in such a mechanistic view is that God "himself in common with his creatures" is "subject in his acting to the same laws with inferior beings" and thus ultimately deprived of his place as "the head of the universe" and as "the foundation & first spring of all."[91] Instead, believing the "material world, and all things pertaining to it, is by the Creator wholly subordinated to the spiritual and moral world," Edwards thought nature's role lay ultimately in "showing forth and resembling spiritual things." Further, divine activity in the world is not limited by natural laws, for "God in some instances seems to have gone quite beside the ordinary laws of nature." For example, "God in some things in providence, has set aside the ordinary course of things in the material world to subserve to the purposes of the moral and spiritual, as in miracles." And in order "to show that all things in heaven and earth, the whole universe, is wholly subservient" to divine power and will, "God has once or twice interrupted" the course of nature "as when the sun stood still in Joshua's time."[92] This was of course also the view of Boyle, and of New-

87. Boyle, *About the Excellency and Grounds of the Mechanical Hypothesis*, 139.
88. Isaac Newton, "General Scholium," *Sir Isaac Newton's Mathematical Principles of Natural Philosophy and His System of the World*, ed. Florian Cajori, 2 vols (Berkeley and Los Angeles: University of California Press, 1934), 2: 544. Newton wrote the "General Scholium" for the second edition of the *Principia* (*The Mathematical Principles of Natural Philosophy*, 1687) of 1713.
89. Isaac Newton, "Four Letters to Richard Bentley," Letter III, 25 February 1693, in *Newton's Philosophy of Nature: Selections from His Writings*, ed. H. S. Thayer (New York: Hafner, 1974), 54. See also Richard S. Westfall, "The Rise of Science and the Decline of Orthodox Christianity: A Study of Kepler, Descartes, and Newton," in *God and Nature: Historical Essays on the Encounter between Christianity and Science*, ed. David C. Lindberg and Ronald L. Numbers (Berkeley and Los Angeles: University of California Press, 1986), 233.
90. James E. Force, "Newton's God of Dominion: The Unity of Newton's Theological, Scientific, and Political Thought," in *Essays on the Context, Nature, and Influence of Isaac Newton's Theology*, ed. James E. Force and Richard H. Popkin (Dordrecht: Kluwer, 1990), 86.
91. Edwards, *Miscellany* # 1263.
92. Edwards, "Images of Divine Things," # 43 (c.1735), 61.

ton and his closest followers such as Samuel Clarke and William Whiston. Indeed in the *Opticks* Newton claimed that his conception of nature affirmed the voluntarist doctrine of divine omnipotence — everything in the world is "subordinate to him, and subservient to his will." And given God's will was "the only causally efficacious agency in nature," God "may vary the Laws of Nature, and make worlds of several sorts in several parts of the universe."[93] Yet, it should be noted that "Newton and Whiston prefer *not* to demonstrate the specially provident aspect of God's dominion over nature by recourse to miracles, if at all"; for without "God first creating and then sustaining the generally regular operations of nature, there could be no ordinary concourse of natural law to describe with mathematical principles."[94]

V

Edwards therefore strongly opposed the mechanistic interpretation of "natural laws" because these laws — setting up a mediating sphere between God and his creation and thus signifying that God governs the world only through secondary causes — severely restricted God's power and limited the divine immanence. Instead of detaching God from the world, Edwards rather attempted to heal the growing breach between the order of grace and the order of nature by re-stating, as in classical and medieval theology, the natural world as a special mode of reality ontologically subordinated and inferior to a higher divine reality. He therefore defined the created order's function in God's overall redemptive plan as consisting mainly in reflecting images and shadows of divine reality: God "makes the inferior [world] in imitation of the superior, the material of the spiritual, on purpose to have a resemblance and shadow of them."[95]

Edwards refused to allow secondary causes an exclusive role in the regulation and operation of the world. To accord nature intrinsic qualities and powers of its own, and to admit that world phenomena are regulated by secondary causes or natural laws, would signify that God is "making use" of "means that operate by their own power and natural forces," which might lead to the conclusion that he is using "mediate causes" and "second causes" in ordering the world.[96] Most important, to admit that world phenomena are regulated only by the laws of nature would mean that God is "limiting himself by such invariable laws fix[e]d from the beginning of the creation," thus seriously undermining his power. Edwards spoke therefore "in opposition" to the mechanistic concept that God's activity is "confined to & limited by those fix'd establishments & laws commonly called the laws of nature."[97] And he

93. Heimann, 273; Oakley, 436; Gascoigne, "From Bentley to the Victorians," 226–7.
94. Force, 87–8. For Boyle's views on miracles, see McGuire, "Boyle's Conception of Nature," 526.
95. Edwards, "Images of Divine Things" # 8 (1728), 53.
96. Edwards, "A Divine and Supernatural Light," 1734, in *Jonathan Edwards: Basic Writings*, ed. Ola E. Winslow (New York: New American Library, 1966), 131.
97. Edwards, *Miscellany* # 1263.

emphasized time and again, "God's providence over the world consists" only "partly in his governing the natural world according to the course and laws of nature."[98] He denounced the mechanistic view that divine activity within the created order is restricted to God's imposition of the laws of nature from infinite space above, and he was unwilling to accept that God's relationship with the natural world should be confined to that of a cosmic lawgiver operating from some undefined place. Such a view of the deity as a mechanic became more and more widespread during the eighteenth century. Increasingly Newton's achievements were associated with "revealing the watchmaker God," the image of "a Creator-Mechanic," or with the concept of "a God of order rather than with an interventionist Deity."[99] Benjamin Franklin, for example, argued that in America "God Almighty is himself a mechanic" and "he is respected and admired more for the variety, ingenuity, and the utility of his handiworks."[100]

In mechanical philosophy the only conceivable way for God to express himself in nature was through external laws, such as the laws of motion. Defining God's relation with the world in mechanical terms, the new scientific culture of space and time led increasingly to the detachment of God from the processes of nature. God still firmly held dominion over creation, but his redemptive activity was not considered as inextricably immanent. Rather, it was defined as external to nature and expressed more and more in terms of the laws of mechanics: No longer immanent in creation, the divine activity was assigned the role of ordering world phenomena according to mechanical laws or general abstract rules which could be expressed in terms of the mechanics of matter and motion.

With the mechanization of the natural world, the notion of God's relationship to it changed radically. The same can be said about Newton: "Newton's God was first and foremost the *kosmokrator*, ruler over everything,"[101] or "a 'universal ruler' (*pantokrator*),"[102] and not, as in classical and medieval thought, a God whose symbolic presence was manifested in the nature and harmony of creation. For him "only a God of true and supreme dominion is a supreme and true God" and this "at the expense of God's love and, apparently, God's intellect."[103]

It has been argued that the source for Newton's God of Dominion, as articulated in the General Scholium, may be found in his Arianism.[104] New-

98. Edwards, "Notes on Scripture," # 389 (1739), in *Works of Jonathan Edwards*, vol. 15, *Notes on Scripture*, ed. Stephen J. Stein (New Haven: Yale University Press, 1998), 373.
99. Gascoigne, "From Bentley to the Victorians," 230.
100. Benjamin Franklin, "Information to Those who Would Remove to America," 1782, as quoted in Liah Greenfeld, *Nationalism: Five Roads to Modernity* (Cambridge, Mass.: Harvard University Press, 1992), 408.
101. Funkenstein, 90.
102. J. E. McGuire, "The Fate of the Date: The Theology of Newton's *Principia* Revisited," in Osler, *Rethinking the Scientific Revolution*, 276.
103. Force, 79, 83.
104. Richard S. Westfall, "Newton's Theological Manuscript," in *Contemporary Newtonian Research*, ed. Zev Bechler (Dordrecht: D. Reidel, 1987), 130; Force, 75–102. For the transformation in Newton's thought concerning God's relation to His creation, see McGuire, "The Fate of the Date," 271–96.

ton's Arianism precluded him from giving a significant role to Christ in the creation; "even Jesus Christ, falls under the dominion of God."[105] Thus, "the Son receiving all things from the Father, being subject to his executing his will, sitting in his throne and calling him his God . . . For the word God relates not to the metaphysical nature of God but to dominion."[106] Newton's disciples Clarke and Whiston adopted a similar view regarding the nature of God's dominion, along with its necessary consequence that Christ is not divine in his metaphysical nature. Obviously, this conception of the God of Dominion was opposed to the doctrine of the Trinity.

Edwards's theology, on the contrary, is Trinitarian, according Christ a crucial role in ordering and managing the created order. To safeguard the divine nature of Christ and His role in creation from Arian tendencies, Edwards argued "that God three in one, all that he is, and all that he has" does "possess all things" in creation. Christ, therefore, does "possess all things." Indeed, the "universe is [his]" or God's, "only he has not the trouble of managing of it; but Christ, to whom it is no trouble, manages it for him."[107] Things in the world therefore "are left to his ordering and government" so that "the Father reigns by the Son."[108] It is in this grand teleological and theological context that Edwards declared that Christ managed every "atom in the universe" to the "advantage of the Christian."[109] Not only that "the Son of God created the world"[110] and "all things" in the world "will be managed so as shall be most agreeable to his will,"[111] but the whole "works of creation and the laws of nature, and that course of nature that God established in creation, is subordinated" to Christ's "work of redemption."[112] Evidently, for him the centre-point in his philosophical theology is God's great act of redemption in Jesus Christ.[113] In sum, Edwards's "understanding of nature was finally determined by a Christocentric construction of the world."[114]

The "mechanists' God" was "a God of general providence and only rarely, in the case of miracles, a God of special providence."[115] The classical and medieval God intimately present in creation was thus transformed in mechanical philosophy into a cosmic lawgiver God who exercises his dominion over the created order from an infinite space above. No longer intrinsically related to the very essence of material bodies, the divine activity was conceived rather as external to tangible, created beings. The world of nature was

105. Force, 80.
106. Newton, Yahuda MS 15.1, Hebrew University, Jerusalem, as cited in Force, 79.
107. Edwards, *Miscellany # ff* (c.1723), 184.
108. Edwards, *Miscellany* # 609 (c. 1733).
109. Edwards, *Miscellany # ff* (c.1723), 184.
110. Edwards, *Miscellany* # 108, 279.
111. Edwards, *Miscellany # ff* (c.1723), 183–4.
112. Edwards, *Miscellany* # 702 (c. 1737).
113. Edwards's focus on redemption in Jesus Christ is analysed most recently in Ann Taves, *Fits, Trances and Visions: Experiencing Religion and Explaining Experience from Wesley to James* (Princeton: Princeton University Press, 1999).
114. John F. Wilson, "Introduction," *Works of Jonathan Edwards*, vol. 9, *A History of the Work of Redemption* (New Haven: Yale University Press, 1989), 47–8.
115. Deason, 187.

thus excluded from any role in the affairs of divine providence. God himself, removed from the inner development of natural phenomena, could only exercise his dominion over nature by external laws expressed in terms of the mechanics of matter and motion. The mechanical philosophers therefore radically transformed the traditional Christian dialectic of God's utter transcendence and divine immanence; divine activity was restricted mainly to maintaining and preserving world phenomena. As Newton wrote in the *Opticks*, 1704: "the Wisdom and Skill of a powerful ever-living Agent" is revealed in his ability "to form and reform the Parts of the Universe."[116]

VI

The mechanistic conception of God as a cosmic legislator indeed posed a grave question regarding God's relationship to the world: What role could be left for God to play in a universe which runs like a clockwork? For Edwards the danger in the Newtonian scientific system was that it placed so much emphasis on the regular working of natural laws, which led to the undermining of God's redemptive role in creation. Such a prospect, which might lead to materialism and to endorsing fate in the regulation of the world, alarmed Edwards profoundly. Since God exercises an "absolute and universal dominion" over his creation, he argued, "it is fit" that his supremacy "should appear" in "those things by which he makes himself known, or by his *word* and *works*; i.e. in what he says, and in what he does." It is God's intention, "that his works should exhibit an image of himself their author," and "what manner of being he is, and afford a proper representation of his divine excellencies."[117] Pervaded by divine meaning and significance, nature is not divorced from God's providential plan, but is rather accorded a singular role to play in reflecting images and shadows of the ontologically superior divine reality beyond it: "The Book of Scripture is the interpreter of the book of nature two ways: viz. by declaring to us those spiritual mysteries that are indeed signified or typified in the constitution of the natural world; and secondly, in actually making application of the signs and types in the book of nature as representations of those spiritual mysteries in many instances."[118]

The desire to establish God's absolute sovereignty led to the re-enchantment of the world, or the deification of the order of creation. However, Edwards's God is not the *Deus Absconditus* of Martin Luther who hides himself and is unknown in creation, but rather *Deus Revelatus*, the God who reveals himself constantly in the world: "'Tis very fit and becoming of God, who is infinitely wise, so to order things that there should be a voice of his in his work instructing those that behold them, and pointing forth and showing

116. Newton, *Opticks*, 403.
117. Edwards, *Dissertation I. Concerning the End for which God Created the World*, 1765, in *Works of Jonathan Edwards*, vol. 8, *Ethical Writings*, ed. Paul Ramsey (New Haven: Yale University Press, 1989), 424, 422.
118. Edwards, "Images of Divine Things" # 156 (1743), 106.

divine mysteries and things more immediately appertaining to himself, and his spiritual kingdom."[119] The deification of nature means that God constantly reveals himself in creation: "the works of nature are intended and contrived of God to signify and indigitate [represent] spiritual things."[120] Hence the natural world constitutes a special dimension of reality, revealing continuously the "voice or language" of God: "The works of God are but a kind of voice or language of God, to instruct intelligent beings in things pertaining to himself."[121]

Edwards's theology of nature, which proclaims the immediate presence of divine power and activity in the whole fabric of the universe, clearly has more affinity with medieval theology, which was based upon a "sense of God's symbolic presence in his creation, and the sense of a universe replete with transcendent meaning and hints,"[122] than with the mechanistic conception of nature which accorded God the role of a "cosmic legislator,"[123] or a "Universal Ruler" who governs the world of nature merely according to abstract and general natural laws.[124]

Mechanical philosophy's disenchantment of the world is further demonstrated by the replacement of the classical and medieval notion of a finite cosmos organized according to a grand theological teleology of order, or a great chain of being structured according to a hierarchy of values and entities, by the non-hierarchical world of nature, deprived of any value concepts. Boyle, for example, "rejects the view that nature is hierarchically constructed. Cosmic egalitarianism is a keystone of his thought."[125] The scientific and philosophical revolution of the seventeenth century thus led to a conception of the universe which can be described as "bringing forth the destruction of the Cosmos, that is, the disappearance, from the philosophically and scientifically valid concept, of the conception of the world as a finite, closed, and hierarchically ordered whole . . . and its replacement by the indefinite and even infinite universe which is bound together by the identity of its fundamental components and laws, and in which all these components are placed on the same level of being."[126] Given that all "natural bodies are essentially of the same kind," the classical and medieval "distinction between earthly and celestial bodies" and motions "has become obsolete."[127]

Seventeenth-century scientific thought constructed a new conception of the essential nature of reality, a new vision "of nature as thoroughly homogeneous and therefore nonhierarchical,"[128] in contrast to the classical and medieval one in which nature "reveals God's symbolic presence, and was seen as

119. Edwards, "Images of Divine Things," # 57 (1737), 67.
120. Edwards, "Images of Divine Things," # 55 (1737), 66.
121. Edwards, "Images of Divine Things" # 57 (1737), 67.
122. Funkenstein, 116.
123. Deason, 186.
124. Newton, "General Scholium," 544.
125. McGuire, "Boyle's Conception of Nature," 533.
126. Koyré, 4.
127. Heidegger, 286, 288, 292.
128. Funkenstein, 10.

a system of symbols, or signatures of God."[129] In classical and medieval theology, God "authored *two* books: the Bible and the Book of Nature." In such a system of thought, "events in nature, like linguistic expressions, are signs. To study them is to decipher God's meaning. Here natural observations do play a part in the determination of belief, but they do so *only because they are a kind of testimony*."[130] Thus, if for Hugh of St Victor "the whole sensible world is like a kind of book written by the finger of God," and "each particular creature is somewhat like a figure . . . instituted by the divine will to manifest the invisible things of God's wisdom," for Galileo "the universe" is a "grand book . . . written in the language of mathematics."[131] With the developing scientific notion of a one-dimensional, homogeneous, symmetrical, uniform and nonhierarchical nature, the "testimony" of nature became more and more problematic, as did the very notion of divine immanence and activity in the created order. "Nature no longer comprised a vast array of symbols which points to a transcendent realm beyond it."[132] Because "scientists since the seventeenth century wanted their scientific language to be as unambiguous as possible" they "emptied nature of intrinsic meanings." Therefore "no longer were natural phenomena to symbolize and reflect each other and that which is beyond them; the symbolic-allegorical perception of nature as a network of mutual references was discarded as a source for protracted equivocation."[133] Hence, the "medieval sense of God's symbolic presence in his creation, and the sense of a universe replete with transcendent meanings and hints, had to recede if not to give way totally to the postulates of univocation and homogeneity in the seventeenth century."[134] Robert Greene, a fellow of Clare College, for example, attacked Newton's work on the ground that "the Philosophy of Homogeneous Matter" is a "revival of Epicureanism," and as such "undermining Christian belief."[135]

The reason behind this strong reaction to the mechanical universe is not hard to understand. It was "of the greatest consequence for succeeding thought that now the great Newton's authority was squarely behind that view of the cosmos which saw in man a puny, irrelevant spectator . . . of the vast mathematical system whose regular motions according to mechanical principles constituted the world of nature."[136] Deprived of any integrity of its own, as well as of inner teleological development and ends, the world of nature in mechanical philosophy was transformed into a huge machine, an engine or a clockwork, based upon cold mechanical principles and operating according to

129. Funkenstein, 49.
130. Nancy Murphy, *Theology in the Age of Scientific Reasoning* (Ithaca: Cornell University Press, 1990), 5.
131. Peter Harrison, *The Bible, Protestantism, and the Rise of Natural Science* (Cambridge: Cambridge University Press, 1998), 1.
132. Harrison, 168.
133. Funkenstein, 28–9.
134. Funkenstein, 116.
135. Gascoigne, *Cambridge in the Age of the Enlightenment*, 167–9.
136. Edwin A. Burtt, *The Metaphysical Foundations of Modern Physical Science: A Historical and Critical Essay* (London: Routledge, 1967 [1924]), 236.

abstract laws. As such, of course, it could not play any role in the mystery of divine providence.

The strongest negative reactions to the new scientific culture were evidently uttered in religious circles, given that the premises of mechanical philosophy seriously undermined the traditional Christian conception of the personal God who operated through history and concerned himself with the affairs of intelligible creatures on earth. The impersonal God of mechanical philosophy, the Lord of the physical world and the cosmic lawgiver, obviously differed from the living God of the Bible whom Christians had worshipped for many centuries — God the Savior and Redeemer, the triune God of special as well as of general providence, Jesus the personal Saviour, and the Holy Spirit, the mediating power between God and human beings.

VII

For Edwards this process of the disenchantment of the world was totally unwarranted. To reassert God's power and will within creation, he returned to the classical and medieval notion that God authored two books, Scripture and nature, arguing that nature reflects the transcendent meanings and symbols of divine things. Scripture therefore is the "interpreter of the book of nature," because only God's revelation can illuminate "those spiritual mysteries that are indeed signified or typified in the constitution of the natural world."[137] Not only did Edwards reject the mechanical vision of a one-dimensional world of nature, but he denounced the consequences of such a view, which implies the exclusion of value concepts from the order of creation. One of the main results of the mechanical view of the universe was the "discarding by scientific thought of all considerations based upon value-concepts, such as perfection, harmony, meaning and aim, and finally the utter devalorization of being, the divorce of the world of value and the world of fact."[138] This transformation, affecting the whole fabric of the universe, was of course unacceptable. In his theology of nature Edwards returned to the classical (Platonic) and medieval (Neo-Platonic) notion of the great chain of being, or, as he called it, "the order of creation," and strove to show that the fabric of the universe is indeed essentially founded upon a theological teleology of values which in turn defines the ontological status of beings in creation. Attempting to save God's presence and redemptive activity in the world, Edwards invoked the notion of a hierarchically ordered universe, declaring that the whole created order is characterized by "communication between one degree of being and the next degree of being."[139] This view was developed previously by the Cambridge Platonists, a group of seventeenth-century philosopher-theologians including Henry More (1614–87), Ralph Cudworth

137. Edwards, "Images of Divine Things" # 156 (c. 1743), 106.
138. Koyré, 4.
139. Edwards, *Miscellany # tt* (c. 1723), 190.

(1617–88), and John Smith (1616–52), who "adhered to the ancient doctrine of microcosm and macrocosm which they related to the great chain of being. Thus various levels of reality emanated from God in an ordered hierarchical structure."[140]

Edwards's quest was to rescue creation which was in danger of gradual detachment from the affairs of divine providence and to reconstitute the essence of natural phenomena as radically and immediately dependent on God's power and will. Although he was not able to maintain the classical and medieval notion of the union between the order of grace and the order of nature, Edwards nevertheless was not willing to see their extreme separation or disunion in mechanical philosophy. For him nature played an important function in divine providence, being a medium that exhibited and illuminated the images and shadows of the divine reality beyond and above it. Envisioning the whole universe as imbued with God's symbolic meanings and signs, he said that "spiritual beauties are infinitely the greatest, and bodies . . . but the shadow of beings" because the role of tangible, material bodies is indeed to "shadow forth spiritual beauties."[141] Further, "that which truly is the substance of all bodies is the infinite exact and precise and perfectly stable idea in God's mind."[142] He in fact accepted the mechanical premise that nature is totally passive, but claimed that without God's redemptive activity nature has no existence or being of its own.

This is the source of Edwards's idealism, of his view that the universe "exists nowhere but in the divine mind," and therefore "those beings which have knowledge and consciousness are the only proper and real and substantial beings, inasmuch as the being of other things is only by these."[143] He denounced the view that human beings can "actually perceive by their senses" a true and objective picture of the world: "I hardly know of any other prejudices that are more powerful against truth of any kind than . . . those of imagination." For example, "the ecstasy" of imagination could lead one even "to pronounce the world infinite,"[144] something he could not accept because it undermines God's sovereignty; if the material world is infinite, it neither needs nor even admits God's creative and redemptive action. He rejected the Copernican revolution because God "contrived the diurnal revolution of the sun around the earth in perpetual successions" in order to avoid "the fatal inconvenience that would have arisen from the sun's always standing over one side of the earth."[145] Likewise, he denied "the mechanical cause of gravity," and argued rather that it should be "attributed to the immediate operation

140. McGuire, "Boyle's Conception of Nature," 542. See also Hunter, 182, and C. A. Patrides, ed., *The Cambridge Platonists* (Cambridge: Cambridge University Press, 1980).
141. Edwards, "Beauty of the World" (c. 1726), *Works of Jonathan Edwards*, vol. 6, *Scientific and Philosophical Writings*, 305.
142. Edwards, "The Mind," 344.
143. Edwards, "Of Being," 206.
144. Edwards, "Of the Prejudices of Imagination," 197.
145. Edwards, "God's All-Sufficient for the Supply of Our Wants" (1729), *Works of Jonathan Edwards*, vol. 14, *Sermons and Discourses, 1723–1729*, ed. Kenneth P. Minkema (New Haven: Yale University Press, 1997), 477–8.

of God."[146] "Divine power," he declared, "is every moment exerted to the upholding of the world."[147]

To replace the mechanical explanation, Edwards formulated his own idealism; "all existence is mental," hence "the existence of all exterior things is ideal. Therefore, it is a necessary being only as it is a necessary idea."[148] Since "the substance of all bodies is the infinitely exact and precise and perfectly stable idea in God's mind,"[149] the "world is therefore an ideal one."[150] He thus denied creation any independent ontological status and the phenomena of the world any intrinsic teleological qualities and powers, in order to argue for the created order's absolute contingency.[151] The realm of nature is radically dependent upon God's will and power, because "the existence of the whole material universe is absolutely dependent on idea."[152] God's absolute sovereignty in the world was thus reaffirmed and rescued from the limitations placed on it by mechanical philosophy. Edwards could conclude that "all arts and sciences, the more they are perfected, the more they issue in divinity, and coincide with it, and appear part of it."[153]

In constructing his theology of nature, Edwards strove to provide a whole new philosophical and theological alternative to mechanical philosophy, which would take into account his profound religious and theological persuasions regarding God's sovereignty and the divine presence in the world. To do this he adopted a two-fold strategy; first he claimed that God created the world so that "things natural" would "livelily represent things divine and spiritual."[154] Instead of understanding natural phenomena in terms of the mechanics of matter and motion, he argued "all body is nothing but what immediately results from the exercise of divine power."[155] Since divine agency is the source of all being and existence, God's redemptive activity is secured and his immanence affirmed within the whole fabric of the universe. Conceiving the realm of nature as a specific though inferior mode of reality, ontologically subordinated to a higher divine reality, Edwards could then assert that "the works of nature are intended and contrived of God to signify and indigitate [represent] spiritual things."[156] In this cosmological vision, the created order was infused with transcendent meaning, and the existence of every being in the world was endowed with theological and teleological significance.

146. Edwards, "Things to be Considered," 234.
147. Edwards, 241.
148. Edwards, "The Mind," 341.
149. Edwards, 344.
150. Edwards, 351.
151. Edwards's idealism resembles that of Berkeley, though they developed their views independently. Berkeley expressed his ideas on this issue in *A Treatise Concerning the Principles of Human Knowledge*, 1710. For a comparison of their views, see Kaiser, 244–53; Anderson, "Introduction," 102–3; and McGuire, "Boyle's Conception of Nature," 531, 537.
152. Edwards, "The Mind," 353.
153. Edwards, "Outline of 'A Rational Account'" (c. 1740), *Works of Jonathan Edwards*, vol. 6, *Scientific and Philosophical Writings*, 397.
154. Edwards, *Miscellany* # 118 (c. 1724), 284.
155. Edwards, "Of Atoms," 215.
156. Edwards, "Images of Divine Things," # 55 (1737), 66.

Second, Edwards invoked the classical and medieval notion of a hierarchical universe structured according to a theological teleology of a great chain of being, or in his words an "order of being." In the order of "the creation," he said, "there is an immediate communication between one degree of being and the next degree of being" according "to the *order of being* [emphasis added]."[157] Yet, because in Edwards's idealism the natural order was deprived of any contribution to and participation in the affairs of divine providence, and since "nothing else has a proper being but spirits,"[158] therefore "in the various ranks of beings, those that are nearest to the first being should most evidently and variously partake of his influence," or "be influenced by the operation of the Spirit of God."[159] Hence in "the order of beings" the "most noble of all, and that which is most akin to the nature of God" is "the soul of man."[160]

The concept of a hierarchical chain of existence included all beings, material as well as spiritual, from the lowest in nature to the highest in heaven, and the place and value of every being in the universe was determined by "the greater or lesser distance which separate it from the First Cause."[161] However, Edwards was after all affected by the scientific thought which denied the created order any participation in divine providence. His hierarchical ladder of being, therefore, consisted of spirits only, because "perceiving being only is properly being,"[162] and not of material, tangible things which cannot be involved in or contribute to divine providence. Accordingly, the principle underlying his theological teleology of the order inherent in the structure of the universe was "excellency" which defines the gradations within the hierarchy of spirits according to their consent to the supreme being, or God. Thus, in "the order of beings in the natural world, the more excellent and noble any being is, the more visible and immediate hand of God is there in bringing them into being; and the most noble of all" is "the soul of man."[163] Since "so far as a thing consents to being in general, so far it consents to him" or God, hence "the more perfect created spirits are, the nearer do they come to their creator in this regard."[164] In other words, God determines the ontological status of beings according to the place he accords them in the cosmological hierarchy of the chain of beings: "The nearer in nature beings are to God, so much the more properly are they beings, and more substantial . . . spirits are much more properly beings, and more substantial, than bodies."[165]

Constructing the created order's ontological status as inferior and thus subordinated to the divine reality beyond it, and conceiving the universe as structured according to a grand scheme of a hierarchical chain of beings, or

157. Edwards, *Miscellany # tt* (c. 1722), 190.
158. Edwards, "The Mind," 337.
159. Edwards, *Miscellany* # 178 (c. 1725), 327.
160. Edwards, *Miscellany* # 541.
161. Cassirer, 39.
162. Edwards, "The Mind," 363.
163. Edwards, *Miscellany* # 541.
164. Edwards, "The Mind," 337.
165. Edwards, "Things to be Considered," 238.

spirits, was Edwards's main strategy in combating mechanistic natural philosophy. Through it he sought to close the growing gap between the order of grace and the order of nature and to combat the increasing disenchantment of the world. His return to the classical and medieval notion of the chain of being signified a radical departure from current scientific thought. The notion of the hierarchical order of the universe as a chain of created spirits, based upon the concept of "excellency," which defined these spirits' relation to God, enabled him to claim that "God created the world for the shining forth of his excellency,"[166] thus establishing world phenomena as a mode of reality in which "the beauties of nature are really emanations, or shadows, of the excellence of the Son of God."[167] Believing thus that the whole creation is the overflowing of divine being, continuity in the course of nature depends moment by moment on God's immanent activity. This re-enchantment of the world was the solution to the problem of God's transcendence and immanence.

166. Edwards, *Miscellany* # 332 (c. 1728), 410; *Concerning the End for which God Created the World*, 526–36.
167. Edwards, *Miscellany* # 108 (c. 1727), 279; *Concerning the End for which God Created the World*, 530–1.