

imposing brow, and he cultivated the kind of bushy-bearded, unkempt look that bespoke obsessive erudition. He devoured volumes on pure mathematics the way his friends consumed novels and poetry.<sup>7</sup> The self-tutelage paid off—in his freshman year he topped all other undergraduates to win the highest mathematical honors of the university.<sup>8</sup> By the age of twenty, Peirce was helping Nathaniel Bowditch translate and annotate Laplace's revolutionary astro-mathematical work, *Mécanique Céleste*, and a couple of years after graduation he secured a position at Harvard as a tutor. A mere year later he became the Hollis professor of Mathematics and Natural Philosophy, and a decade after that added a chair in astronomy. In those capacities Peirce wrote on facets of pure mathematics—trigonometry, geometry, algebra, the calculus—as well as on topics in mechanics, the motion of stars, fluid dynamics, and even theoretical meteorology. Beyond his academic duties, Peirce became the consulting astronomer to the *American Ephemeris and Nautical Almanac*, the President of the American Academy of Arts and Sciences, and the Superintendent of the United States Coast Survey. At Harvard he also (like his father) served a stint as the college librarian, and by lecturing on a comet in 1843 helped secure funding and support to build the Harvard Observatory. Peirce's preliminary calculations regarding irregularities in the orbit of Uranus were instrumental in the work of Urbain Le Verrier and John Couch Adams. In the final decade of his life, following the publication of *Linear Associative Algebra*, Peirce retreated from his campus celebrity. He handed over the reins of his professorship to his son James and gave himself wholeheartedly to theology and philosophy, elements that had simmered beneath his work in mathematics. Religious concerns formed the core of what he believed to be his true magnum opus, the two-hundred-page *Ideality in the Physical Sciences*, published posthumously in 1881.

## Unitarianism and Transcendentalism

While his public image would seem to have entailed a life of solitary number crunching, Peirce thrived on discussion with other intellectuals, most of whom were like-minded religious idealists. Throughout his life he was particularly affected by his commerce with Ralph Waldo Emerson and Unitarian theologians. The transcendentalist Emerson, of course, was forth-rightly a promoter of idealism; the Unitarian clergymen Peirce admired and associated with in his formative years were equally so disposed. Indeed, Emerson came to see the Unitarianism of the 1840s as a religious incarnation of philosophical idealism.<sup>9</sup> The Platonist bent of Emerson and the mid-nineteenth-century American Unitarians—focused on accessing a

higher plane rather than scriptural, liturgical, or ecclesiastical concerns—matched Peirce's priorities. From the perspective of these idealists, God cast the human mind in the mold of His divine Mind, which allowed for a spiritual understanding of pure mathematical thought. Religious sources therefore helped Peirce to discover the meaning and motivation behind his work with variables and formulas. Not only was mathematics a profound spiritual endeavor in this idealist vision, but it also held the potential to reinvigorate faith in a way that undermined the authority of the mainstream clergy and churches.

This affinity between Unitarian theology and pure mathematics comes into view if one looks at the nature of Unitarianism in the first half of the nineteenth century. The word Unitarian was originally a derogatory term, used in the eighteenth century by its opponents as a rebuke of those who failed to acknowledge the doctrine of the Trinity.<sup>10</sup> Early Unitarians such as Richard Price saw things differently, of course, believing they were returning to an original Christian faith unfettered by dogma, including the Athanasian Creed, that had been developed long after the life of Jesus. In the early nineteenth century, however, Unitarian theologians shifted their concern from the exact nature of godhood to a greater concentration on the relationship between man and God. This latter topic was far more contentious. By the beginning of the Victorian age, in fact, Unitarianism was anything but unified. One branch of the sect looked to the Bible for piety and Scottish realism for philosophy, and remained a coherent church. Another branch of Unitarians found their inspiration in Kant and German idealism instead.<sup>11</sup> "I have long seen that the Unitarians must break into two schools,—the Old one, or English school, belonging to the sensual and empiric philosophy,—and the New one, or the German school (perhaps it may be called), belonging to the spiritual philosophy," the Unitarian minister and Harvard Divinity School professor Convers Francis wrote in his diary in 1836.<sup>12</sup> The "German school" argued for communion with God through Kant's transcendental reason. They derided Lockean philosophy, with its emphasis on sensory experience, in favor of the inner intuition of religious truth.<sup>13</sup> The theological tenets and anti-ecclesiastical bent of this latter branch of Unitarianism would support the Platonic conception of mathematics; in turn, the divine characterization of mathematics underwrote the central arguments of this nascent faith.

The connection between radical Unitarian thought and Platonic mathematics was particularly strong in the United States. Mathematical idealists and transcendental Unitarians joined in a revolutionary view of mankind, knowledge, and God that was highly antithetical to the tradition of Calvinism. Among their principles was the sense that humanity was not severely defective and thus could

come to a high state of knowledge, that God has endowed humanity with the ability to comprehend the universe in a transcendental way, and that religion should tend toward the pure and ideal, not the liturgical or ecclesiastical. Each of these points was extended into the characterization of pure mathematics: through mathematics, mankind was capable of great things, arising out of a state of ignorance and coming into communion with God; God endowed human beings with pure mathematical concepts for just such a purpose; the best mathematics tended toward the pure and ideal, not the applied.

One American theologian who sided with the radicals during the Unitarian split and whose thought dovetailed nicely with mathematical idealism was Theodore Parker (1810–1860).<sup>14</sup> Parker's sermon "The Transient and Permanent in Christianity" (1841), for instance, forthrightly exhibited the religious idealism germane to Peirce and others who saw mathematics as rising above the base and particular opinions of human beings. "There seems to have been, ever since the time of [Christianity's] earthly founder," Parker declared, "two elements, the one transient, the other permanent. The one is the thought, the folly, the uncertain wisdom, the theological notions, the impiety of man; the other, the eternal truth of God. These two bear, perhaps, the same relation to each other that the phenomena of outward nature, such as sunshine and cloud, growth, decay, and reproduction, bear to the great laws of nature, which underlies and supports them all."<sup>15</sup>

Parker worried that the transient had overtaken the permanent in the dogmatic faith of his age. He echoed his British counterpart Thomas Carlyle's clothing metaphor (from *Sartor Resartus*) when he wrote that specific doctrines and liturgy "are the robe, not the angel, who may take another robe quite as becoming and useful. ... Looking behind or around us, we see that the forms and rites of the Christians are quite as fluctuating as those of the heathens."<sup>16</sup>

Appalled by the climate of sectarianism and ecclesiastical authoritarianism, Parker lashed out at the established churches. He proclaimed that "what passes for Christianity with popes and catechisms, with sects and churches, in the first century or in the nineteenth century, prove transient also."<sup>17</sup> The one true faith is instead that which communes with "the ideas of Infinite God."<sup>18</sup> Parker believed that the age of dogmatic Christianity would soon pass, giving way to a new harmonious era free of theological disputes. The doctrine of the Trinity, the belief in the divine origin and absolute authority of the Old and New Testaments, and similar dogmas "are fleeting as the leaves on the trees," he thought.<sup>19</sup> "It is hard to see why the great truths of Christianity rest on the personal authority of Jesus, more than the axioms of geometry rest on the personal authority of Euclid or Archimedes," Parker noted. Rather, he continued, "the

authority of Jesus, as of all teachers, one would naturally think, must rest on the truth of his words, and not their truth on his authority.”<sup>20</sup> “Christianity,” Parker famously concluded, “is not a system of doctrines, but rather a method of attaining oneness with God.”<sup>21</sup> Such rhetoric energized idealist mathematicians, for it seemed to imply that pure mathematical research could be a grand spiritual pursuit.

As the more conservative wing of Unitarianism increasingly emphasized Scripture in the second quarter of the nineteenth century—clearly in opposition to theologians like Theodore Parker—Transcendentalism assumed the mantle of idealism in America. The “Concord School of Philosophy” and especially its high priest Ralph Waldo Emerson greatly influenced Benjamin Peirce and other New England mathematicians. As Charles Sanders Peirce jocularly recalled about his childhood, “I may mention, for the benefit of those who are curious in studying mental biographies, that I was born and reared in the neighborhood of Concord—I mean in Cambridge—at the time when Emerson, Hedge, and their friends were disseminating the ideas that they had caught from Schelling, and Schelling from Plotinus, from Boehm, and from God knows what minds stricken with the monstrous mysticism of the East.”<sup>22</sup> Many of the interactions between Benjamin Peirce and Ralph Waldo Emerson took place in the Saturday Club, an association of intellectuals of all stripes in which Peirce and Emerson were charter members. The Club was full of writers, scientists, and clergymen who had been exposed to German philosophical idealism (generally through Coleridge) and who desired a new direction in American thought.<sup>23</sup> Emerson in particular guided Club discussions toward idealism. As he plainly stated, his philosophy of Transcendentalism was “Idealism; Idealism as it appears in 1842.”<sup>24</sup> Peirce became a good friend and intellectual coconspirator of Emerson, eventually using the pillars of Emerson’s philosophy to support a towering conception of mathematics. Indeed, Emerson’s form of idealism would serve as the backdrop for the spiritual depiction of pure mathematics in nineteenth-century America.

Just as Benjamin Peirce was establishing his long tenure at Harvard University, the young Emerson was invited to give his groundbreaking address to the senior class of the Divinity School (1838). The religious vision Emerson evoked in that lecture, colored with Friedrich Schleiermacher’s intuitionism and shaded by William Ellery Channing’s liberal Unitarianism, displayed all of the marks of a maturing Transcendentalism. Emerson had in mind a broad audience for his address, not merely the graduating class of clergymen; he hoped his voice would carry beyond the walls of Divinity Hall into the greater intellectual circles of Boston and New England.<sup>25</sup>

Prefiguring Parker, Emerson described contemporary Christianity as a husk of its true self. Emphasizing the superficiality and

hollowness of human opinions and dialects, he lamented that “the idioms of [Jesus’s] language and the figures of his rhetoric have usurped the place of his truth; and churches are not built on his principles but on his tropes. Christianity became a Mythos, as the poetic teaching of Greece and Egypt, before.”<sup>26</sup> The Bible, seeming like a fossil of ancient faith, cast spirituality in the past tense: “Men have come to speak of the revelation as somewhat long ago given and done, as if God were dead ... the goodliest of institutions becomes an uncertain and inarticulate voice.”<sup>27</sup> Furthermore, Emerson labeled the clergy (supposed stewards of religious belief and interpreters of Scripture) as hypocrites: they asked the poor to be hopeful, yet failed to invite them for supper; they demanded donations for missionary purposes, yet failed to spread faith locally. Organized religion “has lost its grasp on the affection of the good and the fear of the bad,” Emerson bemoaned, “In the country, neighborhoods, half [of the] parishes are *signing off* ... It is already beginning to indicate character and religion to withdraw from the religious meetings. I have heard a devout person, who prized the Sabbath, say in bitterness of heart, ‘On Sundays, it seems wicked to go to church.’”<sup>28</sup> Perhaps most unsettling about the state of religious practice, Emerson thought, was the way in which it stifled the great intellectuals of society, who should be its greatest promoters. “Genius leaves the temple to haunt the senate or the market. Literature becomes frivolous. Science is cold” when true spirituality is absent from culture, Emerson told his audience.

Refraining from gloomy cynicism, however, Emerson proceeded to diagram a necessary Copernican reformation of faith, placing ideal elements at the center and moving human constructions to the periphery. He first condemned superficial ministers of religion: “The man who aims to speak as books enable, as synods use, as the fashion guides, and as interest commands, babbles. Let him hush.”<sup>29</sup> He then sought to revive faith, to set it in motion once again: “The stationariness of religion; the assumption that the age of inspiration is past, that the Bible is closed; the fear of degrading the character of Jesus by representing him as a man; indicate with sufficient clearness the falseness of our theology. It is the office of a true teacher to show us that God is, not was; that He speaketh, not spake.”<sup>30</sup> To revitalize religion, Emerson urged his generation to concentrate on connecting with the mind of God. “The sentiment of virtue is a reverence and delight in the presence of certain divine laws,” he told the graduating class.<sup>31</sup> This communion meant that theology and pioneering intellectual work would be combined, with great minds leading the way: “I look for the new Teacher that shall follow so far those shining laws that he shall see them come full circle; shall see their rounding complete grace; shall see the world to be the mirror of the soul; shall see the identity of the law of gravitation with purity of heart; and shall

show that the Ought, that Duty, is one thing with Science, with Beauty, and with Joy.”<sup>32</sup> The Transcendentalist would be an active genius, reinvigorating faith.<sup>33</sup>

Moreover, the best scientists could be a part of this vanguard. Like Plato, whom he revered, Emerson delighted in the search for absolute laws that govern the universe in all of its particularity.<sup>34</sup> Presaging the odes to the discovery of Neptune, Emerson described grand scientific formulas as ideal, and thus spiritual: “Even in physics, the material is ever degraded before the spiritual. The astronomer, the geometer, rely on their irrefragable analysis, and disdain the results of observation. The sublime remark of Euler on his law of arches, ‘This will be found contrary to all experience, yet is true;’ had already transferred nature into the mind, and left matter like an outcast corpse.”<sup>35</sup> Comparing the greatest work of the natural philosopher with the greatest work of the poet, Emerson lauded their comparable divine achievements: “It is, in both cases, that a spiritual life has been imparted to nature; that the solid seeming block of matter has been pervaded and dissolved by a thought; that this feeble human being has penetrated the vast masses of nature with an informing soul, and recognized itself in their harmony, that is, seized their law.”<sup>36</sup> Science in its purest form comes into contact with the transcendental realm and transcribes its ideal concepts. Emerson thus performed an important service for mathematical idealists by placing the work of preeminent scientists on a par with the geniuses of poetry and art. Although he spoke little on mathematics per se, religious American mathematicians would be drawn to Emerson’s thought, extending Transcendentalism into a field of which he was mostly ignorant.<sup>37</sup>

Emerson’s notion that “the intellect” could rise above the biases of culture would also resound within mathematical circles. For Emerson, the intellect unveils ideas already extant on a higher plane, beyond the petty differences of human opinion. The abstraction of the mind permits humans to escape the prison of their age and culture: “The consideration of time and place, of you and me, of profit and hurt, tyrannize over most men’s minds. Intellect separates the fact considered, from *you*, from all local and personal reference.”<sup>38</sup> Constructing a view of transcendental objectivity that would become an important part of the nineteenth-century pure mathematician’s self-image, Emerson emphasized the potent, detached nature of the intellect. “In the fog of good and evil affections it is hard for man to walk forward in a straight line. Intellect is void of affection and sees an object as it stands in the light of science, cool and disengaged. The intellect goes out of the individual, floats over its own personality, and regards it as a fact, and not as *I* and *mine*,” he argued.<sup>39</sup> Mathematical reasoning, theorists such as Benjamin Peirce would assert following

Emerson, is furthest removed from the profane and emotional realm of common humanity.

## **The Development of Peirce's Theology of Mathematics**

Peirce's maternal uncle, Ichabod Nichols (1784–1859), was as important as Emerson and the transcendental Unitarians in shaping the ideas of the young mathematician. A pioneering liberal theologian who also happened to be a mathematician of no small talent, Nichols was the first to urge Peirce to come to a full appreciation of the spiritual significance of pure mathematics. He taught his nephew that mathematical work, especially in its most rarified incarnations, could be a religious testament. Educated at Harvard, from which he graduated at the age of eighteen as valedictorian, Nichols went on to become a mathematics tutor at the college. However, his stint as a professional mathematician was merely a way station to a highly desired career in the clergy. Studying theology along with mathematics, Nichols prepared himself to receive holy orders in the Congregational Church in 1809.

The ordination process was not what he or others expected. The ecclesiastical council, getting wind of Nichols's highly unorthodox theology, split in their decision to confirm him to a parish in Portland, Maine. His writing and sermons contained evidence that Nichols had drifted into a position that he and others called, in a somewhat vague and unsatisfactory way, "liberal Christianity."<sup>40</sup> Explicitly denying the doctrine of the Trinity and other central dogmas of traditional Christianity, he had in fact become a Unitarian. The other Congregationalist minister of Portland vigorously objected to this orientation, and Nichols and his supporters on the council—of which there were more than a few—seceded to form their own church. Freed from the doctrinal confines of the Congregational Church, Nichols finally had the latitude to preach his own brand of faith. That system of belief was radically ecumenical, with the mathematician-minister's sights constantly on highest common denominators. As one admirer commented, he tended to "the largest views" in all matters.<sup>41</sup>

Separation from the Congregational Church also allowed Nichols to declare that mathematics was just as important as the Bible, since mathematical conceptions, in his view, were thoughts from the mind of God. Nichols believed that the symbols, processes, and laws of mathematics did not originate in this profane realm; in their purity and efficacy they proved themselves to be emissaries from the heavenly realm. As a friend recalled, for Nichols "meditations on a mathematical law" were equivalent to "adoration, praise, or prayer" to the divine.<sup>42</sup> His shift from mathematics to the ministry was thus far from a tremendous change—the two careers were alternate vocations