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JOHANNES KEPLER'S PURSUIT *of* HARMONY

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The great astronomer linked the speed of planetary orbits to musical scales—and to the harmonious interaction of humans on Earth during a time of religious warfare.



Most people who have heard of Johannes Kepler, pictured here at age 39, remember him primarily as an astronomer who changed our understanding of planetary motion. He is most famous for his discovery that planets move in elliptical orbits rather than in the pure circles theorized by those who came before him. He deemed Earth a planet like any other, one that revolved annually around the Sun. That belief made him one of the first to accept Copernicus's heliocentric cosmos.

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But Kepler did not view astronomy as his highest calling. In a letter from 1605, written only a few weeks after he formulated his theory of elliptical orbits—following a careful study of the orbit of Mars—he wrote the following to a friend in London: “If only God would set me free from astronomy so that I might turn to the care of my work on the harmony of the world.”¹ Kepler was referring not only to the work that would become his 1619 masterpiece *The Harmony of the World* (see figure 1), containing what we now call the third law of planetary motion, but also to a larger project that linked the harmonic motions of the cosmos to the possible future harmony of humans on Earth.

Kepler devoted his life to the cause of harmony; it was both the intellectual bedrock for and the crucial goal of his seemingly disparate endeavors. To Kepler, the quest was not merely academic or theoretical. The world in which he lived was beset by overwhelming discord as the Holy Roman Empire moved ever closer to a devastating religious and civil war. The spark that finally ignited the conflict was the famous 1618 defenestration of Prague, in which aggrieved Protestants threw two Catholic bureaucrats and their unfortunate secretary from a third-story window. That incident took place a mere four days before Kepler completed his *Harmony of the World*, and the war the incident began would ultimately wipe out one-third of Germany’s population.

Yet Kepler persisted in pursuing his goal of harmony through the discordant havoc of war, exile, his excommunication from the Lutheran Church, and a great deal of personal loss and hardship. His ultimate goal was both to reveal the harmony in nature and to work toward a worldly harmony that might follow from it. Although Kepler’s ideas about what might constitute earthly harmony changed over time, he ultimately came to believe that following God’s harmonic model in the heavens meant accepting the peaceful coexistence of diverse religious views on Earth.

Kepler the astronomer-priest

The fact that Kepler doesn’t seem to have wanted to spend the majority of his time on the things that made him famous is rep-

resentative of the trouble we moderns have had both in understanding him and in understanding premodern science more generally. Kepler had varied interests, from astrology and music to politics and chronology, and he wrote a great deal on many subjects, from short works on snowflakes and trips

to the Moon to long pamphlets on theology. Even though he spent so much time developing precise astronomical calculations based on observation—the kind of thing historians want to see as representative of the scientific enterprise—his eclectic interests have made it difficult to fit him into traditional stories of the history of science, which describe a progressive move away from ungrounded and inaccurate speculation toward objectivity and precision.

Then comes Kepler’s strange relationship with the churches of his day. Kepler was raised as a Lutheran, studied theology in the seminary at Tübingen, and hoped to become a priest. That plan did not happen. Instead, he was sent to serve as a teacher of mathematics at the Lutheran high school in Graz. When he was expelled from the Catholic city along with its other Lutheran residents, he moved to Prague to work under Tycho Brahe, famed astronomer and imperial mathematician to the Holy Roman Emperor. Ultimately, Kepler rose to become imperial mathematician upon Tycho’s death. Despite his move away from the priesthood, he continued to care about theological ques-

tions, write about theological issues, and frame his pursuits theologically. He was, in his own words, an “astronomer-priest” who unveiled the book of nature for its readers.²

Kepler also continued to identify as a Lutheran even though he was excommunicated from the church in 1619. His excommunication was the result of a disagreement about the Lutheran approach to communion, the ritual in which the presence of Christ’s body and blood is celebrated by consuming sacramental bread and wine. Historians have largely ignored the reasons for Kepler’s excommunication, perhaps because Galileo Galilei’s famous trial over heliocentrism has made it easy to assume that Kepler’s excommunication was rooted in similar causes. In the famous *A History of the Warfare of Science with Theology in Christendom*, Andrew Dickson White posi-

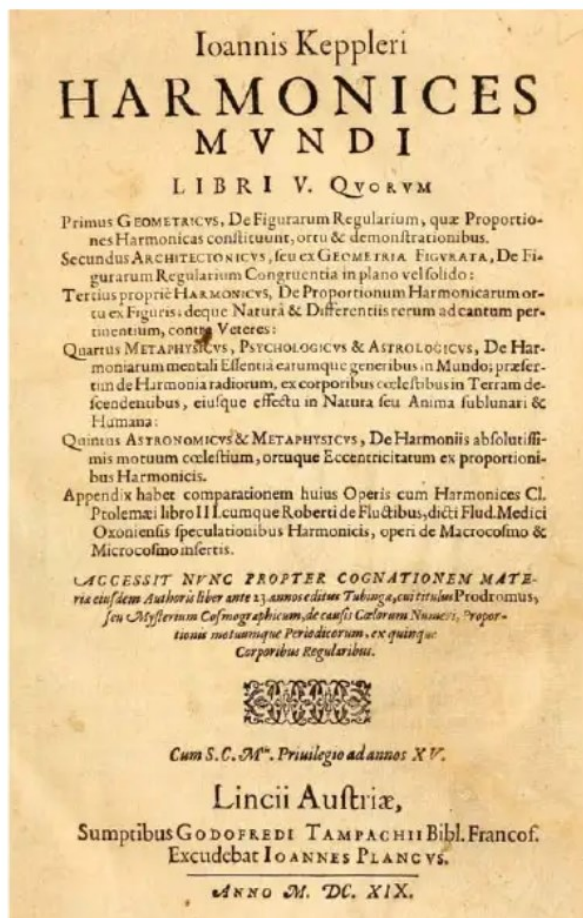


FIGURE 1. THE OPENING PAGE of *Harmonices Mundi* (*The Harmony of the World*) by Johannes Kepler, from the original 1619 printing. (From the Posner Family Collection, Carnegie Mellon University Libraries, PD-US.)

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astronomer–priest, aligning himself with a theology independent of religious strife. Astronomy was a way to reveal God’s hand in the world, one that had some hope of offering universal truths on which anyone could agree.

An unrealized vision

Kepler hoped that in his lifetime he might see a world that followed the model of cosmic harmony. Instead, he saw the opposite—Europe torn apart by the most brutal war it had ever seen. Yet Kepler’s vision is worth embracing—in its hopefulness, its inclusiveness, and its recognition that a community can both disagree and remain united. Kepler himself drew hope from his conception of the origins of harmony. He believed harmony was buried deep within every one of us; eventually, it would work its way out.

In *The Harmony of the World*, Kepler reminded his readers that although the cosmos itself had once produced a perfect and complete harmony, it would not do so again until the end of days—and maybe not even then. God, it seemed, had meant for humans to be satisfied with the beauty of the smaller harmonies produced by individual groups of planets and to accommodate themselves to the dissonance of the whole. Even in that dissonance, they might find beauty.

Kepler ultimately agreed with the poet Alexander Pope, who a century after him thought harmony pointed a way to a world that might be improved by difference. In Pope’s words, such a world would be “Not Chaos-like together crush’d and bruis’d, / But, as the world, harmoniously confus’d: / Where order in variety we see, / And where, tho’ all things differ, all agree.”¹⁴

This article was adapted from my book The Pursuit of Harmony: Kepler on Cosmos, Confession, and Community (University of Chicago Press, 2017).

REFERENCES

1. J. Kepler, *Johannes Kepler Gesammelte Werke (Collected Works of Johannes Kepler)*, C. H. Beck (1937–), vol. 15, letter 357.
2. Ref. 1, vol. 13, letter 91.
3. A. D. White, *The Warfare of Science*, Appleton (1876), p. 65.
4. See, for example, M. J. Osler, *Reconfiguring the World: Nature, God, and Human Understanding from the Middle Ages to Early Modern Europe*, Johns Hopkins U. Press (2010); S. Shapin, *The Scientific Revolution*, U. Chicago Press (1996).
5. See, for example, M. Caspar, *Kepler*, C. D. Hellman, trans., ed., Abelard-Schuman (1959); R. Chen-Morris, *Measuring Shadows: Kepler’s Optics of Invisibility*, Pennsylvania State U. Press (2016); P. J. Boner, *Kepler’s Cosmological Synthesis: Astrology, Mechanism and the Soul*, Brill (2013); U. Rublack, *The Astronomer and the Witch: Johannes Kepler’s Fight for His Mother*, Oxford U. Press (2015).
6. L. Spitzer, *Classical and Christian Ideas of World Harmony: Prolegomena to an Interpretation of the Word “Stimmung,”* A. Granville, ed., Johns Hopkins U. Press (1963).
7. J. Donne, *The Complete English Poems*, A. J. Smith, ed., Penguin (1971), p. 276.
8. N. Copernicus, *On the Revolutions*, J. Dobrzycki, ed., E. Rosen, trans., Johns Hopkins U. Press (1978), p. 4; originally published as *De revolutionibus orbium coelestium*, Johannes Petreius (1543).
9. D. Danielson, *The First Copernican: Georg Joachim Rheticus and the Rise of the Copernican Revolution*, Walker (2006), p. 75.
10. D. P. Walker, *J. Warburg Courtauld Inst.* **30**, 228 (1967).
11. J. Kepler, *The Harmony of the World*, E. J. Aiton, A. M. Duncan, J. V. Field, trans., American Philosophical Society (1997), p. 252.
12. Ref. 1, vol. 12, letter 27.
13. Ref. 1, vol. 12, letter 29.
14. A. Pope, *The Works of Alexander Pope*, vol. 1, J. Balfour (1764), p. 48. 