

7344
OOSTERHOFF, R. J.
2013
p. 531–553

*From Pious to Polite: Pythagoras in the Res publica
litterarum of French Renaissance Mathematics*

Richard J. Oosterhoff

. . . [T]he historian of science rediscovers Pythagoras the scientist; the religiously minded show us Pythagoras the mystic; he who believes in a synthesis above rational analysis tries to show that in Pythagoras the *coincidentia oppositorum* is comprehended in a Basic Idea; the anthropologist finds “shamanism” . . . Pythagoreanism is thus reduced to an impalpable will-o-the-wisp, which existed everywhere and nowhere.¹

Between the fifteenth and seventeenth centuries, Pythagoras became a purveyor of practical, polite secrets. To the Florentine Neoplatonist philosopher Marsilio Ficino, Pythagoras was a prophet, or at least a priest, whose cryptic sayings allowed a glimpse into the mysteries of the cosmos. By the 1650s, Pythagoras’s stock had fallen, that of Archimedes had risen, and—to

I owe a great debt to Robert Goulding and Margaret Meserve for their incisive corrections in all things scholarly, and to Lynn Joy for pushing me to greater rigor. Yelda Nasifoglu, Michael Gordian, and the reviewers offered invaluable advice and encouragement. The result, I know too well, is less than they deserve.

¹ Walter Burkert, *Lore and Science in Ancient Pythagoreanism* (Cambridge, Mass.: Harvard University Press, 1972), 9, quoted in Christopher Celenza, *Piety and Pythagoras in Renaissance Florence: The Symbolum Nesianum* (Leiden: Brill, 2001), 5. For a general study, see Christiane L. Joost-Gaugier, *Pythagoras and Renaissance Europe: Finding Heaven* (Cambridge: Cambridge University Press, 2009). I owe much to Robert Goulding, notably his “Pythagoras in Paris: Petrus Ramus Imagines the Prehistory of Mathematics,” *Configurations* 17 (2009): 51–86.

From Pious to Polite: Pythagoras in the Res publica litterarum of French Renaissance Mathematics

Richard J. Oosterhoff

... [T]he historian of science rediscovers Pythagoras the scientist; the religiously minded show us Pythagoras the mystic; he who believes in a synthesis above rational analysis tries to show that in Pythagoras the *coincidentia oppositorum* is comprehended in a Basic Idea; the anthropologist finds “shamanism” . . . Pythagoreanism is thus reduced to an impalpable will-o-the-wisp, which existed everywhere and nowhere.¹

Between the fifteenth and seventeenth centuries, Pythagoras became a purveyor of practical, polite secrets. To the Florentine Neoplatonist philosopher Marsilio Ficino, Pythagoras was a prophet, or at least a priest, whose cryptic sayings allowed a glimpse into the mysteries of the cosmos. By the 1650s, Pythagoras’s stock had fallen, that of Archimedes had risen, and—to

I owe a great debt to Robert Goulding and Margaret Meserve for their incisive corrections in all things scholarly, and to Lynn Joy for pushing me to greater rigor. Yelda Nasifoglu, Michael Gordian, and the reviewers offered invaluable advice and encouragement. The result, I know too well, is less than they deserve.

¹ Walter Burkert, *Lore and Science in Ancient Pythagoreanism* (Cambridge, Mass.: Harvard University Press, 1972), 9, quoted in Christopher Celenza, *Piety and Pythagoras in Renaissance Florence: The Symbolum Nesianum* (Leiden: Brill, 2001), 5. For a general study, see Christiane L. Joost-Gaugier, *Pythagoras and Renaissance Europe: Finding Heaven* (Cambridge: Cambridge University Press, 2009). I owe much to Robert Goulding, notably his “Pythagoras in Paris: Petrus Ramus Imagines the Prehistory of Mathematics,” *Configurations* 17 (2009): 51–86.

speak very generally—one was likely to find Pythagoras adorning a treatise on the theory of disciplines like swordsmanship and dancing.² Numbers had come down to earth.

This article charts the first, crucial part of this inversion in meanings and importance attributed to Pythagoras, and so to mathematics. Precisely because of his malleability, Pythagoras is a useful marker for understanding the changing attitudes toward mathematics during the early sixteenth century.³ I argue that Renaissance mathematicians used Pythagoras (with the meanings he evoked) to raise the cultural status of mathematics, even practical mathematics which had little proper connection to *Pythagoreanism*. As Walter Burkert has noted, “Pythagorean” can be a dangerously protean term for historians, which makes it important to historicize “Neopythagorean” tendencies in the early sixteenth century, and to mark the independence between ideas derived from Pythagoras’s teaching and use of his authority. I will therefore keep an eye on what counts as Pythagorean mathematics,⁴ while charting how epistolary discourse about Pythagoras crossed disciplines as mathematical culture shifted and grew.

Yet mathematics did not become practical by some kind of inner compulsion; it changed because the *places* of cultural exchange changed.⁵ Following Pythagoras through epistolary cultures in monasteries, universities,

² Girard Thibault, *Academie de l'espée . . . ou se demonstrent par reigles mathematiques sur le fondement d'un Cercle mystereux la Theorie et pratique des vrais et jusqu'a present incognus secrets du maniere des armes a pied et a cheval*, 2nd ed. (Leiden: Elsevier, 1628). For context, see Kate Van Orden, *Music, Discipline, and Arms in Early Modern France* (Chicago: University of Chicago Press, 2005), 54–62 on fencing, 62–67 on dancing. Frances A. Yates documented such use of Pythagoras throughout the seventeenth century in *The French Academies of the Sixteenth Century* (London: Warburg Institute, 1947), 270, 274, 300, 310–11, 313–14. On Archimedes, see Domenico Bertoloni Meli, “Guidobaldo Dal Monte and the Archimedean Revival,” *Nuncius* 7 (1992): 3–34; and Paolo Palmieri, “Breaking the Circle: The Emergence of Archimedean Mechanics in the Late Renaissance,” *Archive for History of Exact Sciences* 62 (2007): 301–46. On mathematical practitioners, see Stephen Johnston, “The Identity of the Mathematical Practitioner in 16th-Century England,” in *Der “Mathematicus”: Zur Entwicklung und Bedeutung einer neuen Berufsgruppe in der Zeit Gerhard Mercators*, ed. Irmgarde Hantzsche (Bochum: Brockmeyer, 1996), 93–120.

³ Brigitte Hoppe surveys the expanding quadrivium in “Die Vernetzung der Mathematisch ausgerichteten Anwendungsgebiete mit den Fächern des Quadriviums in der Frühen Neuzeit,” in *ibid.*, 1–33.

⁴ “Pythagorean mathematics” means the sort of number theory promulgated by Nicomachus of Gerasa and Boethius. A helpful introduction is still Sir Thomas Heath, *A History of Greek Mathematics*, vol. 1, *From Thales to Euclid* (1921; Mineola, N.Y.: Dover, 1981), 64–117.

⁵ Several recent studies have emphasized how place shaped early modern mathematical culture elsewhere in Europe: Adam Mosley, *Bearing the Heavens: Tycho Brahe and the Astronomical Community of the Late Sixteenth Century* (Cambridge: Cambridge Univer-

and finally the new literary academies, this narrative is structured around three overlapping communities of scholars important to the history of mathematics and philosophy in sixteenth-century France.⁶ In these communities Pythagoras was seen as pious, professorial, and finally as a polite practitioner. These shifts correspond to changing social and cultural places for mathematical practice. By looking at what purposes Pythagoras served in each context, I highlight how mathematics became an increasingly visible part of early modern elite culture.

I. PIOUS PYTHAGORAS

Giovanni Nesi, a Camaldolese monk in fifteenth-century Florence, wrote in an orthodox mode when, at his prior's request, he completed a commentary on Pythagoras's *Symbola*, the collection of ethical sayings attributed to the ancient philosopher. Nesi used the Dominican Thomas Aquinas to understand Symbolum 11, "Don't eat your heart."⁷ As Nesi explained, burning is a kind of eating, and, since sin burns the heart, this Pythagorean dictum is an exhortation to avoid sin. This use of Pythagoras stands at one pole of a dichotomy that the most ancient sources on Pythagoras supported. As one twentieth-century study of Pythagoras reports, teachings of the ancient sage had "two faces," one primarily religious and ethical, the other philosophical and scientific.⁸ The one work of Plato that was widely available through the Middle Ages, the *Timaeus*, explicitly outlined a Pythagorean view of nature. Diogenes Laertius's *Lives of Eminent Philosophers* described Pythagoras as the founder of the "Italian" tradition of ancient philosophy that developed alongside the Ionic tradition beginning with

sity Press, 2007); Maria Portuondo, *Secret Science: Spanish Cosmography and the New World* (Chicago: University of Chicago Press, 2009); Alexander Marr, *Between Raphael and Galileo: Mutio Oddi and the Mathematical Culture of Late Renaissance Italy* (Chicago: University of Chicago Press, 2011). For the French context beginning in the 1520s, see Timothy J. Reiss, *Knowledge, Discovery and Imagination in Early Modern Europe* (Cambridge: Cambridge University Press, 1997).

⁶ Jean-Claude Margolin, "L'enseignement des mathématiques en France (1540–70): Charles de Bovelles, Fine, Peletier, Ramus," in *French Renaissance Studies, 1540–70: Humanism and the Encyclopedia*, ed. Peter Sharratt (Edinburgh: Edinburgh University Press, 1976), 109–55.

⁷ Nesi, *Symbolum Nesianum*, in Celenza, *Piety and Pythagoras*, 109.

⁸ G. S. Kirk, J. E. Raven, and Malcolm Schofield, *The Presocratic Philosophers: A Critical History with a Selection of Texts*, 2nd ed. (Cambridge: Cambridge University Press, 1983), 214.

Thales.⁹ Laertius encompassed both poles of Pythagoras's life, but he emphasized the latter's identity as a sage teaching virtue through reflection on ethical sayings about what to eat and how to worship. Mathematics and philosophy were part of a contemplative whole. But Laertius was not fully available in Latin translation until Nesi's Camaldolese colleague Ambrogio Traversari translated the *Lives* from Greek in the 1430s. Precisely how much of Laertius was known during the Middle Ages is a complicated question, well beyond this paper's aims; popular Latin paraphrases such as the *Lives and Customs of the Philosophers* by pseudo-Walter Burley presented a familiar view of Pythagoras as a sage of numbers and ethics.¹⁰ Pseudo-Burley did not describe Pythagoras as the founder of Ionian philosophy, and instead of simply abbreviating Laertius, he added information from other sources. He noted that Pythagoras was the source of Plato's *Timaeus*, adding that the encyclopedist Isidore of Seville believed Boethius's mathematical works to be derived from Pythagoras's writings, and that Augustine, following Cicero's *Tusculan Disputations*, told how Pythagoras had originated the word "philosopher" to describe one who claimed to love wisdom alone, being an expert in no art.¹¹ Pseudo-Burley also reported that Augustine associated Pythagoras with necromancy and magic. His account of Pythagoras is typical, compendious, a collection of sources shaken together. Still, the Pythagoras of pseudo-Burley was less widely known than Pythagoras, the author of the *Golden Verses* that were read in grammar schools alongside the *Symbola* on which Nesi commented. From this viewpoint, it was not obvious that Pythagoras's deepest insights should be mathematical. Some early humanists did value this aspect of Pythagoras, among them Polydore Vergil, whose *On Discoveries* (1499) invoked Pythagoras as the philosopher of harmony, inventor of geometry and the contemplation of the heavens, and the discoverer of mathematical proportions between weights, as well as the inventor of the word "philosopher."¹² Still, even humanists fascinated by numerology, such as Giovanni Pico della Mirandola, barely appreciated Pythagoras's mathematics. Pico admired Pythagoras—he had searched more deeply than Aristotle for truth—but was critical

⁹ Diogenes Laertius, *Lives of Eminent Philosophers*, trans. R. D. Hicks (1925; repr., Cambridge, Mass.: Harvard University Press, 1970), 8.1.

¹⁰ Jan Prelog, "De pictagora phylosopho: Die Biographie des Pythagoras in dem Walter Burley zugeschriebenen *Liber de vita et moribus philosophorum*," *Medioevo* 16 (1990): 191–251.

¹¹ Isidore, *Etymologiae* 3; Augustine, *De civ. dei*, 6.5, 7.35, 8.2; Cicero, *Tusc. disp.* 5.3–4 (Cicero mentions Pythagoras *passim*, e.g. 4.1–3).

¹² Polydore Vergil, *On Discovery*, ed. and trans. B. P. Copenhaver (Cambridge, Mass.: Harvard University Press, 2002), i.a. 1.9.2, 1.17.3, 1.17.7, 1.18.3, 1.19.2; on the word *philosophus*, see 1.16.2–3.

of the Pythagoreans, because they thought everything could be explained by number, a shortsighted reduction in Pico's eyes.¹³

In a monastic context such as Nesi's, Pythagoras offered not only ethics, but also a vision of pious devotion.¹⁴ The Mathurin Robert Gaguin, an information hub for humanists in mid-fifteenth-century Paris, exemplified these pious aims. Gaguin spent much of his life as dean of the law faculty at the University of Paris and as an ambassador for Louis XI and Charles VIII.¹⁵ In the 1490s he was hoping to spend his last days in peace in the Mathurin convent at Paris. On September 16, 1496, the elderly humanist sent a letter to his young Dutch friend William Herman of Gouda. The purpose of the letter was to answer some of Herman's questions about the validity of astrology, which contemporaries saw as a practical application of the quadrivium, the mathematical liberal arts (arithmetic, music, geometry, and astronomy/astrology). In his answer, Gaguin put Pythagoras in context. To help Herman learn judgment in these philosophical matters—"one needs to be cautious when picking small flowers from thick thorns"¹⁶—he organized the history of philosophy in two strands, an Ionian one beginning with Thales, and an Italian one, derived from Pythagoras and leading through Plato and Aristotle to the Epicureans. This latter tradition offers the Christian cleric some benefit, and some of these philosophers' opinions "glitter like shining gems," suitable for adorning Christian truth.¹⁷

By mentioning the Ionian and Italian strands of philosophy, Gaguin showed that his view of Pythagoras was influenced by new trends in philosophy from across the Alps.¹⁸ At first glance, it seems that he might have

¹³ Anthony Grafton, *Commerce with the Classics: Ancient Books and Renaissance Readers* (Ann Arbor: University of Michigan Press, 1997), 119, 125–26. Cf. Pico's glancing discussion of Pythagoras in *De dignitate hominis oratio*, section 22, in *Opera* (Bologna, 1496), 135r–v.

¹⁴ On the monastic context, see Paul Oskar Kristeller, "The Contribution of Religious Orders to Renaissance Thought and Learning," *American Benedictine Review* 21 (1970): 1–55.

¹⁵ Franck Collard, *Un historien au travail à la fin du XVe siècle: Robert Gaguin* (Geneva: Droz, 1996).

¹⁶ Louis Thuasne, ed., *Robert Gaguini Epistole et orationes* (Paris: Bouillon, 1904), 2:37: "Cautione opus est cum ex densis, Vuillelme, spinis flosculos carpis."

¹⁷ Ibid., 38: "Que tamen apud illos sententie velut gemme fulgentes micant, nec pietati adversantur, eas ad ornatum et decorem veritatis desumere catholici doctores non prohibent, presertim ab iis qui consonantia fidelibus disciplinis tradiderunt."

¹⁸ See Anthony Levi, *Renaissance and Reformation: The Intellectual Genesis* (New Haven: Yale University Press, 2004), 154–74; Philippe de Lajarte, *L'humanisme en France au XVIe siècle* (Paris: Honoré Champion, 2009), 52–53. For the counternarrative, see Gilbert Ouy's position, as summarized by Evencio Beltran, "L'humanisme Français au temps de Charles VII et Louis XI," in *Préludes à la renaissance* (Paris: CNRS, 1992), 132–62.

taken this view of philosophical history from Augustine's *City of God*, which also placed Pythagoras at the head of Italian philosophy. But Traversari's new translation of Laertius made clear that the Italian school which Pythagoras apparently founded ended in Epicurus—something Augustine neglected to mention. Italian philosophers, understandably, were attracted to the idea of an ancient Italian tradition. For example, following this reading, Lorenzo Valla began his *Repair of the Whole of Philosophy* with the statement that Pythagoras was the teacher of Italy, to be trusted far more than the followers of Aristotle.¹⁹ It did not hurt, of course, that the philosophical history these humanists followed confirmed the older tradition of philosophy found in Augustine. Pythagoras was a convenient point on which to harmonize ancient and traditional sources—but primarily as the founder of a tradition, not as a mathematician.

In the early 1490s Pythagoras was growing popular in Paris too, especially in the circle around Jacques Lefèvre d'Étaples, an arts master at the Collège du Cardinal Lemoine whose circle overlapped with Gaguin's. In 1491–92 he had toured Italy, stopping at Florence and Rome, where he hoped to meet Ermolao Barbaro, Marsilio Ficino, Giovanni Pico della Mirandola, and possibly also met Angelo Poliziano. After his return to Paris, Lefèvre had written a manuscript which applied Pythagorean number theory to magical and astrological theories, much like the Florentines he loved, Ficino and Pico, and like Lefèvre's friend Johannes Reuchlin.²⁰ Lefèvre never published the manuscript, probably because Pythagoras was associated with hidden knowledge meant only for prepared and pure *adepti*; publication was the antithesis of secret wisdom.²¹

For some at Paris, Pythagoras and *Pythagoreanism* possessed a split personality, in which loving wisdom was not related to loving mathematics. Erasmus of Rotterdam saw Pythagoras as the source of maxims around

¹⁹ Lorenzo Valla, *Repastinatio dialectice et philosophie*, ed. Gianni Zippel (Padua: Antenore, 1982), 1–8.

²⁰ Richard Kieckhefer, "Jacques Lefèvre d'Étaples and the Conception of Natural Magic," in *La magia nell'Europa moderna*, ed. Fabrizio Meroi (Florence: Olschki, 2007), 63–78; Jan R. Veenstra, "Jacques Lefèvre d'Étaples: Humanism and Hermeticism in the *De magia naturali*," in *Christian Humanism: Essays in Honour of Arjo Vanderjagt*, ed. Arie Johan Vanderjagt, Alasdair A. MacDonald, and Z. R. W. M. von Martels (Leiden: Brill, 2009), 353–62; and L. Pierozzi and Jean-Marc Mandosio, "L'interprétation alchimique de deux travaux d'Hercule dans le 'De magia naturali' de Lefèvre d'Étaples," *Chrysopoia* 5 (1992): 190–264.

²¹ See Jean-Marc Mandosio's interpretation of *De magia naturali*. Pythagoras and secrecy are explored in Pamela O. Long, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore: Johns Hopkins University Press, 2001), 55–63.

which to base a religious rule.²² Yet he also drew on Pythagoras when describing marriage in ideal terms. According to the sayings and Diogenes Laertius, Pythagoras had defined friendship as a union of souls; how much more should marriage be called a union of spirits!²³ He turned also to Pythagoras for witty sayings about women who ruled men by appearing obsequious.²⁴ Moreover, many of the *Adages* that delighted Europe's intelligentsia in the sixteenth century were developed out of well-known Pythagorean *symbola*. For Erasmus, Pythagoras was good for catchy phrases, but not as a philosopher of numbers.

Yet there was also a long tradition in Paris that connected the two sides of Pythagoras's split personality, joining right living to number theory. William of Conches argued in his *Commentary on the Timaeus* that Plato was a Pythagorean.²⁵ Similarly, Boethius's popularization of the Neopythagorean Nicomachus of Gerasa's *Arithmetic* and his own *On Music* offered important myths about Pythagoras and Pythagorean teaching. Hugh of St. Victor used the Platonic and Boethian sources in the beginning of his *Didascalicon*, his treatise on reading and the liberal arts. He noted that the *Timaeus* depended on "a Pythagorean teaching that similars are comprehended by similars," which Hugh took to imply a rationality in how the natural world was created, which might be understood by the human soul. A few paragraphs later, Hugh claimed that "Pythagoras was the first to call the pursuit of Wisdom philosophy."²⁶ Pythagoras here is both author of this name and author of the notion that rational understanding depends on a rational creation, a point emphasized by mentioning the old tradition that named Pythagoras the inventor of arithmetic.²⁷

This was the philosophical ideal Lefèvre supported. He much admired the Victorines, whose monastery stood just outside the walls of Paris.²⁸ Lefèvre published Richard of St. Victor's *De trinitate*, among the works of other medieval mystics, and letters to his students show him searching out

²² Marcel Bataillon, *Erasmus et l'Espagne* (1937; Geneva: Droz, 1998), 645–46.

²³ Desiderius Erasmus, *Christiani Matrimonii Institutio*, ed. A. G. Weiler (Amsterdam: Elsevier, 2008), 64.

²⁴ Ibid., 195. Also Juan Luis Vives, *Opera omnia* (Valencia, 1782), 4:233.

²⁵ William of Conches, *Glosae super Platonem* (CSEL) 71, 48e–49a. At *Timaeus* 17A, William says (section XII, 23–24), "Plato igitur, ut pitagoricus, sciens maximam perfectionem in numeris esse, quippe cum nulla creatura sine numero possit existere, numerus tamen sine qualibet potest existere."

²⁶ Hugh of St. Victor, *The Didascalicon*, trans. Jerome Taylor (New York: Columbia University Press, 1961), 1.1.2 (46–48).

²⁷ Ibid., 3.2 (83).

²⁸ Augustin Renaudet, *Préréforme et humanisme à Paris pendant les premières guerres d'Italie, 1494–1517*, 2nd ed. (1916; Paris: Édouard Champion, 1953), 521.

further mystical manuscripts in Rhineland monasteries.²⁹ Hugh of St. Victor's own influential discussions of Pythagoras treated the liberal arts as preparation for monastic reading of Scripture. Lefèvre, in the same letter in which he compared Pythagoras and Aristotle, went on to compare Pythagoras's silent mode of speaking with St. Paul and Dionysius, in whom there is "much silence." And while there is little of it in Aristotle, he added, it does exist in Nicholas of Cusa and Richard of St. Victor, in exactly the same way!³⁰ Similarly, Lefèvre pointed out, Odo of Morimond (an early daughter abbey of Cîteaux with connections to St. Victor), wrote sermons and contemplative treatises, including several that used Pythagorean number theory as a way to understand the Bible. As late as 1516 Lefèvre informed his patron François Briçonnet, nephew of Cardinal Briçonnet, that Odo's and Cusanus's writings exemplified "the oldest kind of philosophizing," which stretched back to before Aristotle, Plato, and even Pythagoras himself.³¹ Here, as elsewhere, Lefèvre implied that Pythagoras's thought was both indebted to the Presocratic Greek philosophers and also nourished medieval religious practice. This fit the tenor of Lefèvre's life, in which philosophy always served contemplative ends. In 1491, Lefèvre had nearly been convinced to "quit the world" for the religious life by the *Contemplationes* of the Catalan philosopher Ramon Lull.³²

For Lefèvre, unlike Erasmus, these pious impulses were related to number theory. Lefèvre cultivated a wide circle of students, many of whom followed his numerological interests. Charles de Bovelles was particularly sympathetic to Lefèvre's numerological inclinations and became an important mathematician. When he met Lefèvre in the countryside around Paris

²⁹ Lefèvre to Beatus Rhenanus, from St. Germain, June 24, 1511, in *Briefwechsel des Beatus Rhenanus*, ed. Adalbert Horawitz and Karl Hardfelder (Nieuwkoop: B. de Graaf, 1966), 38. On the Victorine edition, see Eugene F. Rice, "Jacques Lefèvre d'Étaples and the Medieval Christian Mystics," in *Florilegium Historiale: Essays Presented to Wallace K. Ferguson*, ed. J. G. Rowe and W. H. Stockdale (Toronto: University of Toronto Press, 1971), 90–124.

³⁰ Bovelles, *In artem oppositorum introductio* (Paris, 1501), sig. a2r = Eugene F. Rice, ed., *The Prefatory Epistles of Jacques Lefèvre d'Étaples and Related Texts* (New York: Columbia University Press, 1972 [hereafter PE]), ep. 29, 96: "Et ut tibi et multis hac in parte prosim, in Paulo et Dionysio multum silentium, deinde in Cusa et Victorini *homousio*, in Aristotele autem silentii perparum, vocum multum."

³¹ Zamberti/Campanus, *Euclidis Megarensis geometricorum elementorum libri XV*, ed. Lefèvre (Paris, 1516), 1v: "Et hic philosophandi modus vetustissimus fuit, ante etiam Pythagoram, Platonem, et Aristotelem, ut vel ex antiquitate cognoscatur augustior."

³² Ramon Lull, *Contenta: Primum volumen contemplationum Remundi duos libros continens* (Paris, 1505), sig. a1v = PE, ep. 45, 141: "Liber itaque apud me mansit et plurimam mihi attulit consolationem; et paene ad hoc pertraxit, ut demisso mundo Deum in solitudine quaererem."

in 1495, Lefèvre was about to publish his first mathematical works.³³ Lefèvre attached a prefatory letter to Bovelles's first publication, *In artem oppositorum introductio* (1501), a work often compared to those of Ramon Lull and Nicholas of Cusa. It was an exquisitely styled "in-house" letter, addressed to Leonard Pomar, who had studied with Lefèvre around 1494, and who went on to study medicine at Avignon. Recalling fondly their studies together—Lefèvre, Bovelles, Pomar, and another student named Pascal—Lefèvre observed that they had discussed these matters before, and he reminded Pomar that "if Aristotle is the life of studies, Pythagoras is their death, but one superior to life; hence the former rightly teaches by speech, the latter by silence, but a silence which is act and a speech which is privation."³⁴ This crucial line, which should give pause to those who would claim Lefèvre as a wholly committed Aristotelian, has often been misattributed to Bovelles.³⁵

The mistake is understandable, since number mysticism provided Bovelles with the grammar of his whole philosophical method.³⁶ Already in 1501 Lefèvre suggested that Bovelles's method of reconciling opposites belonged to Pythagoras; in 1512, Bovelles published an introduction to natural philosophy which he claimed, after an earlier manuscript version had been corrupted, to have reconstructed from memory. He expanded three missing books by deduction so that the total number of books would be ten, with each book containing one hundred propositions, making a cube of one thousand: "For the number ten is what the Pythagorean doctrine was so concerned with, calling it the greatest and last of all elemental numbers, born of the sum and cumulation of the monad, dyad, triad and tetrad [the four prime and simple numbers]."³⁷ In his *Conclusiones theologicae*

³³ According to the prefatory epistle, Lefèvre completed his edition of Jordanus de Nemore's *Arithmetica* in 1493; he printed a commentary on astronomy first, the *Textus de Sphera Johannis de Sacrobosco* (Paris, 1495, repr. until 1538). Jordanus was first printed the following year: Jacques Lefèvre d'Étaples, *Arithmetica decem libris demonstrata* (Jordanani); *Musica libris demonstrata quattuor*; *Epitome in libros arithmeticos divi Severini Boetij*; *Rithmimachie ludus que et pugna numerorum appellatur* (Paris, 1496). See the partial bibliography in PE, 542–46.

³⁴ Bovelles, *In artem oppositorum introductio*, sig. a2r = PE, ep. 29, 96: "Ergo si ita est, Aristoteles studiorum vita est, Pythagoras autem studiorum mors, vita superior; hinc rite docuit hic tacendo, ille vero loquendo, sed silentium actus est et vox privatio."

³⁵ Emmanuel Faye corrects this misattribution in *Philosophie et perfection de l'homme: De la Renaissance à Descartes* (Paris: Vrin, 1998), 155.

³⁶ On Bovelles as teacher, see Emmanuel Faye, "Beatus Rhenanus lecteur de Platon et d'Aristote à Paris (1503–1507)," in *Beatus Rhenanus (1485–1547): Lecteur et éditeur des textes anciens*, ed. James Hirstein (Turnhout: Brepols, 1999), esp. 124.

³⁷ Charles de Bovelles, *Physicorum elementorum* (Paris, 1512), sig. Aa2v: "Est enim denarius numerus is, quem tantopere versans Pythagorica disciplina numerum elementorum omnium supremum ultimumque appellitare solebat e quattuor primorum ac sim-

(1515), Bovelles reflected on Pythagoras's insight into the completeness of the number ten as enfolding all reality within it, inspiring him to survey all Christian truth in ten chapters.³⁸ Thus it is all the more significant that Bovelles began to distance himself from Pythagoras. A survey of all his letters, published from 1510 onward, shows several references to Plato, but none to Pythagoras. Moreover, in his frequent founding narratives of the sciences, Bovelles mentioned Plato, Moses, or Jubal and the creation of music, or the wisdom of Solomon, but only occasionally Pythagoras.³⁹ Gaguin had connected the ancient theology of Zoroaster, Abraham, and Moses to the Greeks through Pythagoras, which makes Bovelles's omission even more puzzling. The reason for this move away from Pythagoras is likely a sort of biblicism. If at all possible, Bovelles wished to avoid mention of non-biblical figures. He even began to discuss number theory based on the number twelve instead of ten, seeing it as the "superabundant rational number," and one with a dependable biblical pedigree. In his *Liber de duodecim numeris* of 1510, Lefèvre reflected at length on the numerical "principles," the basic numbers among which Pythagoreans had celebrated ten (significant as the tetrad $[1 + 2 + 3 + 4]$ and the base of decimal counting) as containing all of the universe. Bovelles also valued the Pythagorean tetrad, but denied that it represented the world—it only modeled or imaged the human soul. Instead he suggested that the number eleven was the "copulative principle," forming the link between intellectual and physical worlds, being indivisible and truly part of neither, like the angels. Thus number symbolism should be ruled not by ten, but by the number twelve, as the principle of life. To bolster this reorganization of number theory, he invoked the way in which twelve was employed among the Hebrew fathers. The number twelve captured the principles of world history, which would end, he explained, with the twelve stones and three-dimensional structure of the new Jerusalem described in John's Apocalypse.⁴⁰ Since the biblical universe revolved around twelve, not ten, Pythagoras faded.

Another of Lefèvre's students, however, did connect Pythagorean number theory with reading scripture. Josse Clichtove (d. 1543), by 1500 a master in the theology faculty, similarly held high expectations for the exegetical benefits of Pythagoras's teaching. Following the trend set out by

placissimorum numerorum, monadis dyadis tryadis ac tetradis congressione et cumulatione progenitum, et quo pariter Astrologi coelos appraehendunt atque dinumerant."

³⁸ Charles de Bovelles, *Theologicarum conclusionum libri decem* (Paris, 1515), 1v.

³⁹ On Pythagoras in the *prisca theologia* frequently used to justify speculative mathematics, see Joost-Gaugier, *Pythagoras and Renaissance Europe*, 24–29.

⁴⁰ Charles de Bovelles, *Liber de duodecim numeris* (Paris, 1510), fols. 158v–70r.

Odo and the Victorines, he linked understanding the *res* of Scripture to mathematical understanding, and the origins of mathematical understanding itself to Pythagoras, who “especially, with the help of numbers, brilliantly explained much about the natures of things, human customs, and heavenly matters.”⁴¹ The treatise was a handbook on the integers 1 through 20, then large numbers significant in the Bible, such as 50, 70, 100, 144, etc. The short treatise was a guide to the symbolic meanings attached to such numbers, especially in scriptural language and narratives.⁴² Pythagoras here underwrote a whole hermeneutic of the sacred page, much as the Victorines had done.

II. PROFESSOR PYTHAGORAS

Still drawing on the image of “pious Pythagoras,” the letters of Lefèvre and his students show a shift in mathematical ends, beginning already in the 1490s, shaped by pedagogy and new printed textbooks. In 1496 Lefèvre published a volume with an epitome of Boethius’s *Arithmetic*, an edition of the *Elementa arithmetica* by Jordanus de Nemore, his own treatise on musical theory, and rules for the old school number game *Rithmomachia*. The sixteenth century would know Lefèvre as a mathematical thinker because of this textbook.⁴³ Lefèvre dedicated it to Jean de Ganay (c. 1450–1512), president of the Paris *parlement*, member of one of the immensely powerful aristocratic families around Paris, and patron of humanist philosophers such as Marsilio Ficino and Girolamo Aleandro in Italy and Trithemius, Cornelius Agrippa of Nettesheim, and others north of the Alps. Lefèvre assured Jean of mathematics’ practical uses. He listed the Roman emperors “Vespasian, Hadrian, Trajan, Theodosius, Arcadius, Honorius, Constantine, and others who decreed that there be many land surveyors, who maintained for the public use knowledge of measuring, which understanding perfects.” Surveying, as any magistrate could appreciate, was indeed important to rule. But Lefèvre continued, describing how the mathematical disciplines of music and astronomy aided mental acuity and finally supported

⁴¹ Josse Clichtove, *De mystica numerorum* (Paris, 1513), sig. a1v: “Et praesertim Pythagoram . . . numerum praesidio, multa de rerum naturis, de moribus hominum, de supramundanis luculenter edisseruisse.”

⁴² Compare the sermons of Egidius of Viterbo: Ingrid D. Rowland, “Abacus and Humanism,” *Renaissance Quarterly* 48 (1995): 695–727.

⁴³ See the entry on Lefèvre added by the anonymus redactor of Johannes Trithemius, *De scriptoribus ecclesiasticis* (Paris, 1512), 215–216v; also Bernardino Baldi, *Cronica de matematici* (Urbino, 1707), 107–8.

ancient theology, “as if by steps to divine matters.” In one short sentence, Lefèvre indicated that “even now, however, numbers keep their mysteries in sacred Scripture.”⁴⁴ Thus, by taking up mathematics, Jean de Ganay would learn to rule wisely. Pythagorean knowledge of number, as Plato demonstrated in the *Timaeus*, was the basis for knowing nature; and as Plato also showed in the *Republic*, that knowledge was the best instruction for the just ruler.

Jean probably never worked through the whole volume of treatises Lefèvre published, especially the advanced *Arithmetica* of Jordanus. Even Beatus Rhenanus, a talented and diligent student of Lefèvre who generally filled the margins of his textbooks, left his student copy of Jordanus void of notes.⁴⁵ Recognizing their difficulty, Lefèvre included two teaching aids, a short introduction and the game “rithmimachia.” Lefèvre described one of these in a letter to Gianstefano Ferrero, who was only twenty-three years old that year but already the bishop designate of Vercelli; within eight years he would be archbishop of Bologna and then cardinal. Lefèvre informed this powerful patron that he had written a “certain introduction taken from that divine and Pythagorean *Institutio numerorum* of divine Boethius,” in order to offer a “friendly and intimate guide” before reading the interpretations of “others” and before taking on “such a great weight of demonstration.”⁴⁶ The little introduction took key terms from Boethius and organized them for easy access. It became a “cheat sheet” that was frequently reprinted in the sixteenth century, often without the *Arithmetica* it was designed to introduce.⁴⁷

Lefèvre’s care for mathematics was certainly nourished by the contemplative context described in the previous section, but his approach was particularly shaped by pedagogy. In a letter to the physician Bernard Vencario, Lefèvre’s former mathematics student, Lefèvre agreed that “every discipline to which a generous spirit must apply itself is difficult, since all one’s power

⁴⁴ Lefèvre, *Arithmetica*, sig. a1v = PE, ep. 5, 18.

⁴⁵ Bibliothèque humaniste de Sélestat, K 1047b. Beatus did refer to Jordanus occasionally elsewhere. But compared, for example, to Lefèvre’s commentary on Sacrobosco’s *Sphere*, I have found few annotations in exemplars of Lefèvre’s edition of Jordanus.

⁴⁶ Lefèvre, *Arithmetica*, sig. f1r = PE, ep. 9, 31: “. . . occurrit si introductio quaedam ex divina illa et Pythagorica divi Severini Boetii numerorum institutione in medium afferetur, quae et ut domestica familiarisque ante aliorum lectionem et tanta demonstrationum pondera directrix haberetur.”

⁴⁷ Tucked into the 1496 edition of Jordanus’s and Lefèvre’s *De musica*, the *Epitome* opened the 1503 introductory compendium in its several editions and was then printed as a solo booklet in 1533, 1536, 1541, 1549, and 1553.

is concerned with something difficult.”⁴⁸ Lefèvre noted that this did not make the task less worthy, recalling how a certain game had been enjoyed by students; Bernard desired him to include the text with the others “as if a refuge.”⁴⁹ After all, the game might be good for young minds. The treatise is a dialogue between master Alcmaeon, “a mathematical student of Pythagoras,” and two youths. It outlines the piece setting and rules of play for rithmimachia, a game analogous to chess, in which piece movement is determined by arithmetical rules derived from Boethius. The treatise closes as students and master agree that the game encouraged “silent contemplation of divine mysteries.”⁵⁰

In the letters accompanying the mathematical texts Lefèvre published in 1496, mention of Pythagoras chiefly arises as a part of school discourse. The conventions of letters to patrons and the basic difficulties of motivating young students to learn mathematics forced Lefèvre to confront problems of utility, though he persistently managed to steer this use back to the proper contemplative ends of number.

This tension between theory and the actual practice of teaching mathematics appears in two later volumes, one published in 1503, the other in 1507. In 1503 Lefèvre’s students edited a collection of introductions to different mathematical topics, a communal project.⁵¹ The volume included Lefèvre’s *Epitome* of Boethius, but the rest were written by former students, now colleagues, showing Lefèvre’s penchant for communal scholarship. Josse Clichtove, who contributed an introduction to practical arithmetic and a commentary on Lefèvre’s *Epitome*, advertised the book to Jean Molinier, another student and colleague at the Collège du Cardinal Lemoine. Clichtove looked primarily to Pythagoras as the founder of mathematical thinking—of

⁴⁸ Lefèvre, *Elementorum musicalium libri quattuor* (Paris, 1496), sig. i6v: “Considerasti mi Bernarde, omnes disciplinas ad quas generoso spiritu sit annitendum difficiles esse siquidem virtus omnis circa difficile versetur.”

⁴⁹ Ibid.: “. . . huic loco tanquam asylo committerentur voluisti Rithmimachiam simul formari.”

⁵⁰ On Lefèvre’s contributions to the game’s popularity, see Ann E. Moyer, *The Philosophers’ Game: Rithmomachia in Medieval and Renaissance Europe* (Ann Arbor: University of Michigan Press, 2001), 77 and passim.

⁵¹ Jacques Lefèvre d’Étaples, Josse Clichtove, and Charles Bovelles, *Epitome compendiosae introductio in libros arithmeticos divi Severini Boetii, adiecto familiari [Clichtovei] commentario dilucidata. Praxis numerandi certis quibusdam regulis (auctore Clichtoveo). Introductio in geometriam Caroli Bovilli. Astronomicon Stapulensis* (Paris, 1503). Later editions include 1507 (Deventer), 1510 (Paris, partial), 1513 (Cologne), 1522 (Paris), and after 1535 included in several editions of Gregor Reisch’s *Margarita philosophica*, in the version edited by Oronce Fine.

course with an eye to contemplation. Mathematical understanding, moreover, depended on historical legacy. “The first of these [mathematical arts] is arithmetically concerned with pure number[s] and their relations, things which were illustrated in a marvelous way by the most fit judgment of the ancients and the weightiest authority of Pythagoras, for the contemplation of the gods—Pythagoras is considered to be the first investigator of numbers, and left arithmetic as a most commendable guide to them.”⁵² Lefèvre pursued this view of mathematics through Plato, Aristotle, Ovid, Pliny, Plutarch, and so on: that Pythagoras’s authority was venerated throughout the ages was itself demonstration of his veracity. Not so subtly, Clichtove pointed out to Molinier that not only did arithmetical reasoning mark humanity off from the rest of the animal kingdom, but it was also the foundation for geometry. And no one could question geometry’s utility. After all, Clichtove recalled, Plutarch described how in antiquity Archimedes held off the Roman commander Marcellus from capturing Syracuse by means of inventing some siege-engines “by geometrical reasoning.”⁵³ Clichtove, like Lefèvre, could not resist the potential for practical application of Pythagorean learning.

All the letters associated with the 1503 volume were written to fellow students and colleagues, lifting mathematics into a sort of literary republic with influence beyond Paris. Johannes Caesarius shortened the edition in 1507 and added more introductory letters, poems, and commentaries.⁵⁴ Addressing a Cologne audience, Caesarius toned down the explicit Pythagorean associations, instead describing Archimedes as interpreted by medieval theoretical authors such as Boethius, Campanus, Cusanus, and Bovelles himself. His tactics fit a broader trend. For example, in a letter prefacing his own *Arithmetica practica* (1513), first published at Paris but later reproduced for a Spanish context, Juan Martinez Blasius did begin with Pythagoras—as interpreted by Boethius—and then went on to describe his teachers Lefèvre and Clichtove as the preeminent members of that tradition in his own day.⁵⁵ But Blasius closed the treatise with word problems on exchanging currencies and triangulating distances between cities.

⁵² Ibid., sig. a1v = PE, ep. 34, 108: “Quarum prior arithmetice numeros absolutos eorumque affectiones determinat, ad divinorum contemplationem priscorum iudicio accommodatissima et gravissima Pythagorae auctoritate mirum in modum illustrata, qui primus quidem numerorum perscrutator habitus est eorumque indagatricem arithmeticam posteris reliquit commendatissimam.”

⁵³ Ibid., sig. a1v–a2r = PE, 109: “Is [Archimedes] etenim teste Plutarcho machinamentis geometrica ratione excogitatis . . .”

⁵⁴ Johannes Caesarius, ed., *Introductio Jacobi Fabri Stapulensis in Arithmetica; Ars supputandi Clichtovei; Epitome rerum geometricarum Bovilli* (Deventer: R. Pafraet, 1507).

⁵⁵ Juan Martinez Blasius, *Liber arithmetices practice Astrologis phisicis admodum* (Paris: Beluaco, 1513).

III. PYTHAGORAS, POLITE PRACTITIONER

As the sixteenth century continued, French introductions to mathematics were still accompanied by prefatory letters, but rarely did they include a discussion of philosophical history. This did not mean that Pythagoras was no longer a source of interest, or a subject worthy of study, but it did signal two shifts in mathematical culture. First, mathematical disciplines, even within what had traditionally fit within number theory and abacus training, developed porous boundaries as mathematicians recognized their own ability to match and sometimes even criticize the ancients. A poem in a treatise on ratios by the University of Paris physician Jean Fernel—who saw his work as both arithmetic and geometry—captured the shifting sentiment: “Now [Fernel] gives a new face to the quadratic ratios of quantities, / which drives out what the wise Samian [Pythagoras] has done. / Let not the haughty Greek marvel at his own men / Everything has been handed over to our times.”⁵⁶ Pythagoras himself could be questioned, by means of his own mathematical tools. Second, there was a shift in the presentation of mathematics, increasingly in the guise of learned letters. As Giovanna Cifoletti has shown, sixteenth-century French mathematicians developed a rhetoric that borrowed much from the humanistic concern for the linguistic arts.⁵⁷

Pythagoras’s presence and absence in letters associated with mathematics texts will show that these two changes (in disciplinary boundaries and mathematical presentation) occurred swiftly. In music, for example, theorists valued Pythagoras very highly, using him to justify exchange across disciplines. One example among many is Franchino Gaffurio, whose *Theoretica musica* (1492) told all the traditional stories of how Pythagoras discovered the mathematical basis of pitch by hearing a blacksmith hammer different-sized anvils, and how he tamed a drunken youth by simply ordering a musician to play a calming mode.⁵⁸ Another important source was the

⁵⁶ Jean Fernel, *De proportionibus libri duo* (Paris, 1528), sig. a1v: “Nunc nova quantorum tetrico proportio vultu / Prodiit, haec Samij propulit acta sophi. / Non igitur proprios miretur Graecia fastus / Omnia sunt nostris tradita temporibus.”

⁵⁷ Giovanna Cifoletti, “Mathematics and Rhetoric: Peletier and Gosselin and the Making of the French Algebraic Tradition” (Ph.D. dissertation, Princeton University, 1993); idem, “From Valla to Viète: The Rhetorical Reform of Logic and its Use in Early Modern Algebra,” *Early Science and Medicine* 11 (2006): 390–423.

⁵⁸ On these stories, as well as Gaffurio’s reception, see Ann E. Moyer, *Musica Scientia: Musical Scholarship in the Italian Renaissance* (Ithaca: Cornell University Press, 1992), chap. 1. See also Gustave Reese, *Music in the Renaissance* (New York: Norton, 1954), 185–86.

Swiss polymath Henricus Glareanus (1488–1563), who studied with Lefèvre around 1510 and became famous for offering a revised theory of musical modes.⁵⁹ In 1516 he published an *Isagoge in musicen*, which explicitly advanced a Pythagorean (via Boethius) theory of harmonics.⁶⁰ Lefèvre's own *Elementa musicalia* (in the collection from 1496) had likewise encouraged respect for Pythagoras.⁶¹ Particularly in Italy, through Galileo, this tradition may have been significant for establishing empirical questions for the mathematical problems of seventeenth-century mechanics.⁶² Because Pythagoras justified connections between physical realities and mathematical theory, he attracted music theorists as well as others interested in unifying theories, such as Guillaume Postel, astronomer and linguist at the early Collège Royal. Like Reuchlin's dialogues on the Kabbalah before him, Postel's histories of philosophy pointed out the unity of cultures, and the ancient wisdom of Pythagoras provided a convenient single source of the warring sects.⁶³ It was thus that Fernel used Pythagoras to facilitate an exchange across disciplines, justifying the study of ratios because it would benefit his own discipline, medicine. He did this with a Pythagorean notion of harmony, "the single principium of all things," which connected the human organism to the rest of the cosmos. This was, Fernel assured his university colleague Martin Dolet, the ancient Pythagorean teaching.⁶⁴

The most important French mathematician in the first half of the sixteenth century at first seems to be a counterexample to this trend. Oronce Fine was another colleague of Fernel and Dolet at Sainte-Barbe. In 1530 François I appointed Fine as the first mathematical chair at his new Collège Royal.⁶⁵ Whether or not Fine saw himself as heir to Lefèvre's mathematical

⁵⁹ *Dodecachordon* (Basel, 1547).

⁶⁰ Translation and commentary by Frances Berry Turrell, "The 'Isagoge in Musicen' of Henry Glarean," *Journal of Music Theory* 3 (1959): 97–139.

⁶¹ On this work's influence, see Philippe Vendrix, "On the Theoretical Expression of Music in France During the Renaissance," *Early Music History* 13 (1994): 249–73.

⁶² Two recent additions to a growing literature: Benjamin Wardhaugh, *Music, Experiment and Mathematics in England, 1653–1705* (Aldershot: Ashgate, 2008); Peter Pesic, "Hearing the Irrational: Music and the Development of the Modern Concept of Number," *Isis* 101 (2010): 501–30.

⁶³ See William J. Bouwsma, *Concordia Mundi: The Career and Thought of Guillaume Postel, 1510–1581* (Cambridge, Mass.: Harvard University Press, 1957), 49, 260. For Pythagoras's ongoing significance in philosophy, S. K. Heninger, Jr., notes relevant early modern histories in *Touche of Sweet Harmony* (San Marino: Huntington, 1974), 58–59.

⁶⁴ Jean Fernel, *De proportionibus* (Paris, 1528), sig. A4r. Vitruvian claims about proportions in physiology became common during this time, e.g. as popularized by Albrecht Dürer, *Quatre livres de la proportion des parties et pourtraicts des corps humains*, trans. Louis Meigret (Paris, 1557).

⁶⁵ Isabelle Pantin, "Teaching Mathematics and Astronomy in France: The Collège Royal (1550–1650)," *Science & Education* 15 (2006): 189–207.

project,⁶⁶ he did redact and publish many works of his predecessors. Fine published a version of Blasius's practical arithmetic in 1519; he probably produced a title page and the printed marginalia for Simon Colines's 1521 edition of Lefèvre's commentary on Sacrobosco; he edited Bovelles's mathematical introductions for the 1534 Paris edition of Gregor Reisch's *Margarita philosophica*; and he designed woodcuts for later editions of Bovelles's *Geometrie pratique*. Known now mostly for his contributions to mapmaking—applied geometry—Fine also wrote introductions to mathematics. In 1538, 1542, and 1544 (at least) he published an *Arithmetica practica*. This would have been a typical location to mention Pythagoras, the inventor of arithmetic. But without mentioning Pythagoras himself, Fine first referred to Pythagorean views about numbers as taught by Boethius, and then—unlike Fernel—immediately turned away from such philosophical speculation to emphasize that his own work belonged to the genre of *practical* arithmetic. The prefatory letter gives clues as to why Fine did not mention Pythagoras, clues that suggest Fine was trying to respect boundaries within mathematical disciplines as a whole. As a mathematician, not a philosopher, Fine primarily was interested in practical mathematics, not theoretical mathematics. But his students were likely interested more in explanation than in actually making mathematical instruments. Adam Mosley rightly names Fine's mathematics “theoretical practical,” because rather than simply teaching mathematical practice, Fine accounted for the principles of practice.⁶⁷ Fine first commended mathematics because of the particular insight afforded by reflection on unity. He framed the insight in terms long associated with Pythagoras: from unity all other numbers are born—unity itself is not number, but creates number. But then Fine retreated, emphasizing that his own work belonged to the genre of *practical* arithmetic. Theoretical mathematics, he pointed out, deals with the properties, purposes, and powers of numbers; practical mathematics looks to numbers in use. Why was Fine so careful about the distinction? Perhaps Fine was careful to avoid philosophy because his position as *lecteur Royal* was as a mathematician only.

Yet Fine was also sensitive to what constituted theoretical mathematics

⁶⁶ Richard Ross believed that Fine did, though he never stated so explicitly. See his “The Mathematical Works of Oronce Finé” (Ph.D. dissertation, Columbia University, 1971), 360. See now Isabelle Pantin, “Oronce Finé's Role as Royal Lecturer,” in *The Worlds of Oronce Fine: Mathematics, Instruments and Print in Renaissance France*, ed. Alexander Marr (Donington: Shaun Tyas, 2009), 13–30.

⁶⁷ Adam Mosley, “Early Modern Cosmography: Fine's Sphaera Mundi in Content and Context,” in Marr, ed., *Worlds of Oronce Fine*, 114–37.

because that definition was under debate, part of an increasingly abstract “mathematical style” of algebra or solving for unknowns, especially among the French mathematicians Jean Borrel (1492–1572), Jacques Peletier du Mans (1517–82), and Guillaume Gosselin (d. c. 1590).⁶⁸ Together, they mark a developing French tradition of mathematics, one that could be contrasted with the distinctive mercantile tradition of mathematics that Michael Baxandall used to elucidate the “cognitive style” of fifteenth-century Italy.⁶⁹ In Italy, the plastic arts had fostered learned reflection on the artisanal work of painting, sculpture, and architecture in the manner of Vitruvius and his Italian interpreter and critic Leon Battista Alberti—a literature grounded in ideas of symmetry and ratios that could be related to Pythagoras.⁷⁰ Such arts became more popular in France after Charles VIII’s invasion of Italy in 1493–94, yet France did not sponsor similar theorizing until well into the sixteenth century.⁷¹ Vitruvius may have been brought to Paris by Fra Giocondo, who visited in 1499–1506, and whose lectures Lefèvre and his students apparently attended.⁷² Nevertheless, when Bovelles wrote the first French geometry in 1511, he lauded the practical applications of mathematics to human and architectural proportion without mentioning Pythagoras.⁷³ Although historians have long framed the Vitruvian commitment to symmetry and harmony in art and architecture as *Pythagoreanism*,⁷⁴ particularly in France, references to Pythagoras himself as the originator of such harmony are fewer in the world of artisans.

⁶⁸ Giovanna Cifoletti, “Oronce Fine’s Legacy in the French Algebraic Tradition: Peletier, Ramus and Gosselin,” in *ibid.*, 172–90. Also see François Loget, “L’algèbre en France au XVI^e siècle: Individus et réseaux,” in *Pluralité de l’algèbre à la Renaissance*, ed. Sabine Rommevaux et al. (Paris: Honoré Champion, 2012), 69–101.

⁶⁹ Michael Baxandall, *Painting and Experience in Fifteenth-Century Italy* (Oxford: Oxford University Press, 1973), 101, 108.

⁷⁰ Leon Battista Alberti, *L’architettura/De re aedificatoria* (Milan: Edizioni il Polifilo, 1966), 2:821; Antonio Averlino, *Trattato di architettura* (Milan: Edizioni il Polifilo, 1972), 2:562, 578; Pomponio Gaurico, *De sculptura liber*, ed. Abraham Gorlaeus (Antwerp, 1609), 37, 46; Gian Paolo Lomazzo, *Scritti sulle Arti*, ed. Roberto Paolo Ciardi (Florence: Marchi & Bertolli, 1973), 1:23–41, and many index entries.

⁷¹ For the beginnings of this story, see Henri Zerner, *Renaissance Art in France: The Invention of Classicism* (Paris: Flammarion, 2003), 99–121.

⁷² Jacques Lefèvre d’Étaples, *Libri logicorum* (Paris, 1503), 78v. Note Adolfo Tura, *Fra Giocondo et les textes français de géométrie pratique* (Geneva: Librairie Droz, 2008).

⁷³ Charles de Bovelles, *Geometrie en françois* (Paris, 1511), [1]v.

⁷⁴ Vitruvius does mention Pythagoras at *De arch.*, 5. intr., 9. intr., 9.6, 10.6. The basic study is Rudolf Wittkower, *Architectural Principles in the Age of Humanism* (1952; New York: Norton, 1971). Also see George L. Hersey, *Pythagorean Palaces: Magic and Architecture in the Italian Renaissance* (Ithaca: Cornell University Press, 1976); Joost-Gaugier, *Pythagoras and Renaissance Europe*, 145–239.

Instead, Pythagoras's connection to practice was through the developing networks of civility, notably Paris's new literary societies led by Jacques Peletier du Mans and Jean-Antoine de Baïf. These were only the most prominent examples of a growing educational culture apart from Parisian theology that George Huppert has dubbed "the style of Paris."⁷⁵ Mathematics' role in this cultural shift can be seen in Borrel and Gosselin, who spanned the breadth of mathematical innovation in the mid-sixteenth century. They retained relationships with the older pedagogical tradition; Borrel was a Benedictine monk who first studied mathematics with Fine at Sainte-Barbe in the 1520s. The first treatise in his *Opera geometrica* (1554), written while he was abbot of St. Anthony, dealt with the geometry of Scripture, calculating the size of Noah's ark and how many animals it might have comfortably hosted. While he did not dwell on Pythagoras, he did reflect on the shifting cultures of mathematics, kindly criticizing Fine's efforts to square the circle, while himself using mathematics to enrich exegesis of Genesis and Caesar's description of Roman bridges, as well as suggesting that lawyers would find mathematics useful in solving land disputes.⁷⁶ Bridging mercantile solutions for unknowns with the Latin theoretical tradition, Gosselin's treatise on algebraic techniques mentioned the "wise Samian" in a short prefatory poem.⁷⁷

Peletier especially exemplifies the growing role of mathematics in the world of polite letters. In the 1540s he gathered together accomplished poet-scholars who included Pierre de Ronsard and Joachim du Bellay, and who became known collectively as the Pleiade. They, like the more formal *Academie* of Baïf in the early 1570s, extolled the capacity of measured eloquence in poetry and music, consciously claiming ancestry in the Orphic and Pythagorean examples.⁷⁸ Members of this group, and especially Peletier himself, reflected on cosmology and mathematics.⁷⁹ Peletier himself actually

⁷⁵ George Huppert, *The Style of Paris: Renaissance Origins of the French Enlightenment* (Bloomington, Ind.: Indiana University Press, 1999).

⁷⁶ Joannes Buteo, *Opera geometrica* (Lyons: Thomas Bertellus, 1554). On Fine, Borrel recalled how Archimedes and Ptolemy corrected their predecessors: "Id denique multi facientes, de posteris benemerendo, puriores nobis disciplinas reliquerunt" (42).

⁷⁷ Guillaume Gosselin, *De arte magna seu de occulta parte numerorum quae et Algebra et Almucabala vulgo dicitur* (Paris: Gilles Beys, 1577), sig. a5v: "Quale vel à Samio sapiente requirere par sit, | Plurima longa aetas cui didicisse dedit."

⁷⁸ Isabelle Pantin, *La poésie du ciel en France dans la seconde moitié du seizième siècle* (Geneva: Droz, 1995), 180, 381, 422, 492; Kees Meerhoff, *Rhétorique et poétique au XVI^e siècle en France: Du Bellay, Ramus et les autres* (Leiden: Brill, 1986), 15–17, and passim on measurement.

⁷⁹ Isabelle Pantin, "La représentation des mathématiques chez Jacques Peletier du Mans: Cosmos hiéroglyphique ou ordre rhétorique?" *Rhetorica* 20 (2002): 375–89.

contributed to scholarship in mathematics: in 1549 he wrote a vernacular arithmetic that tried to draw the newer mathematics into the ambit of Boethian-Pythagorean sensibilities. Crossing boundaries in mathematics still required the legitimization of Pythagoras, a *topos* powerful among Paris elites.

Peletier attached four letters to his *L'arithmétique*, which used Pythagoras to situate mathematics' relationship to practical and literary life. For his close friend Theodore Beza,⁸⁰ Peletier offhandedly listed how the arts of numbers harked back to the ancients, who received "[p]hilosophy from hand to hand, as if from father to son, Pythagoras, Socrates, Plato, Aristotle," and so on.⁸¹ Pythagoras was only the first in a very long line, however, leading all the way through lists of Greek poets, then Latins, finally to the modern accoutrements made possible by newfangled inventions. Pythagoras headed the philosophical tradition that advanced technology such as printing. The moral was, of course, that this should only make one study harder, particularly the mathematical arts, "which I have valued above all others, like the sun amidst the stars." Peletier told Beza that the new mechanical applications of mathematics did not necessarily degrade their theoretical virtues. The printing press did not make people more stupid, as some claimed, but nurtured curiosity. It was barbarous "Latinity" that had degraded all the liberal arts. By the end of the volume, Peletier's letter to Beza introduced the higher aspects of arithmetic, noting that this sort of theoretical mathematics led to music. Particularly striking about this last letter is that Peletier was discussing problems of calculating interest and finding unknowns (algebra). These had belonged primarily to the cossist, or abacus, tradition, and they managed to remain quite distinct from the Boethian-Pythagorean tradition so favored by musical theorists. Peletier did not so much attempt to shed Boethius (and therefore Pythagoras), as his admiration for Boethius attests. Instead he claimed to incorporate the abacus tradition into something recognizably within the Boethian tradition. He reordered a new tradition of invention with the intellectual discipline of Pythagorean insight.

Evidently, only recently had innovation matched that of Pythagoras's time. Peletier and Beza, at least for a short year, pursued a literary ideal to recover this innovation in letters as well as mathematics on rue Saint-Jacques. In the same Parisian lecture halls, as a member of the Collège

⁸⁰ Natalie Zemon Davis, "Peletier and Beza Part Company," *Studies in the Renaissance* 11 (1964): 188–222.

⁸¹ Jacques Peletier, *L'arithmétique* (Paris, 1549), sig. 2r.

Royal, Peter Ramus was busy inventing his own Pythagoras, transforming him into a systematizer of commonly known mathematical truths.⁸² In 1551 Jacques Charpentier was appointed to Oronce Fine's old chair of mathematics at the Collège Royal. This outraged Ramus, since Charpentier openly despised mathematics. Charpentier pointed out that Pythagoras taught through enigmatic sayings, hiding rather than exposing the truth. In answer, Ramus invented a long history of mathematics, making Pythagoras the pinnacle of mathematical perfection—not because of his mystical insight, but because he gathered the common notions about lines and points from artisans and fishermen.⁸³ While teaching Paris elites, Ramus insisted that practical mathematics legitimated the whole enterprise. Shifty as ever, Pythagoras came along for the ride.

CONCLUSIONS: EXCHANGES IN MATHEMATICAL CULTURE

I have not accounted for the ongoing view of Pythagoras as *magus*, as Gianbattista della Porta promoted it in his popular *Magia naturalis* (1558), or how Pythagoras inspired artistic and architectural feats. Nor have I tracked the presence of Pythagoras in the *prisca theologia*, such as Louis Le Roy would describe in his history of the world, *De la vicissitude* (1575). At first glance, it seems that his view of Pythagoras's silence was similar to what Lefèvre valued half a century before. One can see, Le Roy claimed, that Pythagoras appreciated the Egyptian priests, since “he imitated their mystical mode of speaking in veiled words and hid his teaching and sentences under figurative and enigmatic words.”⁸⁴ Le Roy, however, as a humanist historian of the later sixteenth century, was interested in telling a tale of enlightenment quite different from that of Lefèvre.

Outside of strictly mathematical discourse, Pythagoras was even more widely respected by the second half of the century, but the use of Pythagoras had changed since Erasmus had found him a convenient authority for his popular and practical maxims for living, the *Adages*. This suggests how

⁸² Robert Goulding, *Defending Hypatia: Ramus, Savile, and the Renaissance Rediscovery of Mathematical History* (Dordrecht: Springer, 2010), 35–74.

⁸³ *Scholae mathematicae* (Basel, 1569), 30. See Goulding, *Defending Hypatia*, 46–48.

⁸⁴ D. P. Walker, “The ‘Prisca Theologia’ in France,” *Journal of the Warburg and Courtauld Institutes* 17 (1954): 204–59; Louis Le Roy, *De la vicissitude* (1574), 33v–34r, cited in Walker, 232: “[Pythagoras] voulut imiter leur façon mystique des parler en paroles couvertes & cacher sa doctrine & ses sentences sous paroles figures & énigmatiques.”

much Pythagoras's meaning was dependent on the contexts in which he was employed, whether convent, university, or literary circle. In new books for courtly and elite audiences, Pythagoras was more likely to justify something like practical mathematics, at least in Paris. In 1559 the mathematician Claude de Boissière republished a French translation of Lefèvre's *Rithmomachia*, the Pythagorean board game, but now for entertainment more than to encourage youth in learning. At nearly the same time, Gabriel du Preau published his *Wheel of Pythagoras* (1558), which repackaged an old horoscope game to merge polite culture with popular mathematics.⁸⁵ Such works brought Pythagoras out of the study and into the drawing room, effectively socializing mathematics, integrating it into a developing gentle culture in which rising bourgeois and courtiers bought astronomical rings and navigational treatises to display their learning. Metaphorically, Pythagoras took his place in the *Kunstkammern* that increasingly displayed mathematical objects.⁸⁶ Such socialization did not turn everyone into a mathematician; more than competency, such games and display made mathematics into furniture of the everyday. Pythagoras had been domesticated. And with him, so had mathematics.

University of Notre Dame.

⁸⁵ First printed as "la rouë de Pythagoras" by Gabriel du Preau in the last pages of Christophe de Cattin, *La géomance* (Paris, 1558). This was an ancient question game, surviving in many manuscripts.

⁸⁶ E.g. Sven Dupré and Michael Korey, "Inside the *Kunstammer*: The Circulation of Optical Knowledge and Instruments at the Dresden Court," *Studies in History and Philosophy of Science* 40 (2009): 405–20.

Copyright of Journal of the History of Ideas is the property of University of Pennsylvania Press and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.