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Ghiberti's *St. Matthew* Ensemble at Orsanmichele: Symbolism in Proportion*

Diane Finiello Zervas

I

Ghiberti's statue of *St. Matthew* has long been recognized as an important achievement in his artistic career (Fig. 1). Art historians have praised its classical spirit, its sense of monumentality, its correct anatomy, and contrapposto pose.¹ It has been cited as the clearest evidence of humanist principles in sculpture in the years immediately preceding 1420.² The simple, powerful lines of the figure and the balanced rhythms of its stance and drapery are carefully controlled to create a sense of calm and equilibrium that is unrivaled in Ghiberti's *oeuvre*.

The framing tabernacle plays an important role in reinforcing the mood established by *St. Matthew*. Earlier quattrocento tabernacles on the Orsanmichele façades had been designed by stonemasons rather than by the artists responsible for the enclosed statues; the extent to which the two harmonized was thus fortuitous rather than deliberate.³ By designing the *St. Matthew* tabernacle himself, Ghiberti had complete control over its form and relation to the statue. He created the first Renaissance tabernacle on Orsanmichele, decorating the niche behind the figure with Classical membering and simple paneling, and framing it with a series of clearly defined rectangular and triangular shapes. The forms of Ghiberti's tabernacle, unlike those of the earlier Gothic ones, do not compete with *St. Matthew* for the viewer's attention: they complement the statue, establishing a series of contrapuntal rhythms with it.

Viewed as a whole, the *St. Matthew* ensemble generates such a sense of balance and harmony among parts that it seems to prefigure Alberti's description of successful architecture in *De re aedificatoria*, written more than twenty years after completion of Ghiberti's work: "... There is a certain Excellence and natural Beauty in the Figures and Forms of Buildings, which immediately strike the Mind with Pleasure and Admiration."⁴

Alberti believed that "excellence" and "natural beauty" were achieved through the judicious use of proportion based on musical ratios. An analysis of the *St. Matthew* ensemble suggests that Ghiberti also used a tightly woven propor-

tional system, in some respects very similar to Alberti's, to govern its visual harmonies.

The *St. Matthew* ensemble was commissioned in 1419. By this date Ghiberti had had a wide range of artistic experience, and undoubtedly would have been familiar with a number of proportional techniques. To begin with, he probably had been exposed to the general Florentine mathematical education provided by the *scuola dell'abbaco*: these schools were usually attended by boys bound for apprenticeship in major commercial and artisan guilds. The practical arithmetic (rudimentary accounting, business problems, knowledge of common fractions and simple ratios) and elementary geometry these schools taught constituted a common working vocabulary for the business community, which included artists, goldsmiths, and masons. Ghiberti's earliest contact with this vocabulary could easily have come through his goldsmith stepfather Bartolo di Michele; certainly he would have had to acquire it by 1409, when he formally matriculated into the goldsmith's guild.⁵

Having practiced briefly as a painter before entering the Baptistery competition in 1401, Ghiberti would also have been familiar with late trecento Tuscan workshop techniques. In a recent article, Kathryn Bloom associated the method used by Ghiberti to proportion the relief space of the landscape panels from the east Baptistery door to practices described by Cennino Cennini in his *Libro dell'arte*: foreground figures in the panels are used as modules to organize and lay out the relief space.⁶ Although this method of relating figures to other elements of the composition is actually somewhat simpler than the one outlined by Cennini, it is related, and it demonstrates Ghiberti's use of simple proportional techniques well into the 1430's.

Between 1418 and 1426 Ghiberti was also engaged on architectural projects, and in 1426 he became a member of the stonemason's guild. By 1422, when the *St. Matthew* tabernacle was commissioned, he had designed a staircase for the papal apartment in S. Maria Novella (1419), worked on various models of the Duomo cupola – first in competition and later in conjunction with Brunelleschi (1418–20) –

*Part of this article is based on research done for my doctoral dissertation written under the direction of Professor John White at The Johns Hopkins University in 1973. I would like to thank Professors Charles Trinkaus, University of Michigan, Samuel Y. Edgerton, Jr., Boston University, and Richard A. Goldthwaite and Egon Verheyen, The Johns Hopkins University, for their many helpful comments and suggestions pertaining to earlier versions of the manuscript.

¹ R. Krautheimer, *Lorenzo Ghiberti*, Princeton, 1956, 91.

² C. Seymour, *Sculpture in Italy, 1400–1500*, Baltimore, 1966, 71.

³ See M. Wundram, "Albizzi di Pietro, Studien zur Bauplastic von Or San Michele in Florence," *Das Werk des Künstlers, Festschrift H. Schrade*, Stuttgart, 1960, 161–76.

⁴ L. B. Alberti, *Ten Books on Architecture*, trans. J. Leoni, London, 1726, repr. London, 1955, ed. J. Rykwert, Bk. IX, Chap. v, 194–95.

⁵ For the *scuole dell'abbaco*, see R. A. Goldthwaite, "Schools and Teachers of Commercial Arithmetic in Renaissance Florence," *Journal of European Economic History*, 1, 1972, 418–33; for Italian artists and the *scuole dell'abbaco*, see D. F. Zervas, "The *Trattato dell'Abbaco* and Andrea Pisano's Design for the Florentine Baptistery Door: Mathematical Knowledge of Artists During the Trecento and Early Quattrocento," *The Renaissance Quarterly*, xxviii, 1975. The most likely time for Ghiberti to have acquired the *abbaco* education would have been ca. 1387, when he was nine years old. The *scuole dell'abbaco* were well established in Florence by the early trecento: Giovanni Villani's statistics for the city in 1338 lists six of them, with a total estimated enrollment of between 1 000 and 1 200 students.

⁶ K. Bloom, "Lorenzo Ghiberti's Space in Relief: Method and Theory," *Art Bulletin*, LI, 1969, 164–69.



1 Ghiberti, *St. Matthew Ensemble*. Florence, Orsanmichele (photo: Alinari)

and had been appointed, together with Brunelleschi, supervisor of the cupola's construction (1420).⁷ Involvement with these projects undoubtedly provided him with a knowledge of stonemason's basic proportional methods. Derived in part from *abbaco* geometry, but intimately related to medieval concepts of statics and beauty, they included the use of lengths geometrically but irrationally related to one another, such as those generated by a series of inscribed

squares and circles, or a series of alternately inscribed circles and triangles.⁸

The third decade of the quattrocento was also a period of experimentation with new proportional methods. Through the empirical study of Classical remains, architects such as Brunelleschi were rediscovering modular proportional systems. In 1421 Brunelleschi controlled the ground plan of the Sagrestia Vecchia by a series of geometrically-related, irrational lengths evolved from circles and inscribed squares, yet in the same year he also introduced simple, modular, arithmetic ratios into the ground plan of S. Lorenzo, where they co-existed with geometrically derived lengths.⁹ Ghiberti seems to have been aware of such new proportional practices, as well as the new architectural vocabulary *all'antica*.¹⁰

Not surprisingly, the methods used to proportion the *St. Matthew* ensemble are related to the gamut of techniques mentioned above. From the documents, we know that Ghiberti designed the statue before the tabernacle, between 1419 and 1420, although he would have had to make some decision concerning its size relative to the tabernacle size and both of these relative to the height of the Orsanmichele pier at that time as well.¹¹ A number of proposals have been made concerning the statue's figural proportions. Richard Krautheimer notes a ratio of one to seven between the head and body.¹² The figure's proportions reminded Charles Seymour of a Byzantine adaptation of the Vitruvian canon: he relates them to Ghiberti's canon contained in his *Commentarii*, citing the umbilicus of *St. Matthew* as the body mid-point and an approximate ratio of head and torso to legs of four to five. (Although in his canon Ghiberti places the mid-point at the pelvis, it is his description of the Vitruvian canon that places the mid-point at the navel, a practice with which he personally disagrees: "Non mi pare del centro sia el bellico, parmi debba essere dove è 'l genitale e dove e' nasce overo ov'è la inforcatura humana.")¹³ While Seymour's four to five ratio of head and torso to legs does not work out, his overall impression of the statue is correct, for actual measurements indicate that Ghiberti proportioned it according to the guidelines set down by Cennino Cennini in his *Libro dell'arte* (Fig. 2): ". . . the face is divided into three parts, namely: the forehead, one; the nose, another; and from the nose to the chin, another . . . From the chin under the jaw to the base of the throat, one of the three measures . . . From the pit of the throat to that of the chest, or stomach, one face. From the stomach to the navel, one face. From the navel to the thigh joint, one face. From the thigh to the knees, two faces. From

⁷ Krautheimer, *Ghiberti*, 254–76; A. Manetti, *The Life of Brunelleschi*, intro., notes and critical text ed. by H. Saalman, trans. C. Enggass, University Park, Pa., 1970, 132–40, for Saalman's interpretation of Ghiberti's activity on the *cupola*.

⁸ For medieval proportional procedures, see P. Frankl, "The Secret of the Medieval Masons," *Art Bulletin*, xxvii, 1945, 46–60; J. White, "Measurement, Design and Carpentry in Duccio's *Maestà*, Parts 1 and 2," *Art Bulletin*, LV, 1973, 334–66, 547–69. H. Saalman discusses such methods in "Early Renaissance Theory and Practice in Antonio Filarete's *Trattato di Architettura*," *Art Bulletin*, xli, 1959, 89–106.

⁹ D. F. Nyberg, "Brunelleschi's Use of Proportion in the Pazzi Chapel," *Marsyas*, vii, 1957, 1–7.

¹⁰ For Ghiberti's use of Classical architectural vocabulary – particularly on the *St. Matthew* tabernacle – see H. Saalman, "Filippo Brunelleschi: Capital Studies," *Art Bulletin*, xli, 1958, 113ff.

¹¹ See below, p. 38.

¹² Krautheimer, *Ghiberti*, 100.

¹³ Seymour, *Sculpture in Italy*, 71; Lorenzo Ghiberti's *Denkwürdigkeiten* (*I Commentarii*), ed. J. von Schlosser, Berlin, 1912, II, 231.

the knee to the heel of the leg, two faces. From the heel to the sole of the foot, one of the three measures."¹⁴

Cennini's canon describes a figure eight and two-thirds faces high, excluding the distance from the hairline to the top of the head. Ghiberti's *St. Matthew* measures nine faces, the extra third not mentioned by Cennini given over to the height (Fig. 2).¹⁵

Although Cennini's canon provided Ghiberti with the figural proportions for *St. Matthew* – e.g., the relationships among body parts – it did not provide him with its actual dimensions. Bound by his contract to set the statue height at least equal to that of his bronze *St. John the Baptist*, he made *St. Matthew* four and a half *braccia* high, one fourth of a *braccio* taller than the earlier work, with a face module of a half *braccio*.¹⁶

The statue's proportions and dimensions represent only one aspect of Ghiberti's total design, however. A second important consideration seems to have been the height of the statue plus its base relative to the tabernacle height, and the tabernacle height relative to the height of the pier on Orsanmichele housing the ensemble. These relationships – and the dimensions – were determined geometrically.

One of the geometric problems that appears repeatedly in the *abbaco* primers consists of determining the approximate numerical relation between the diameter of a given circle and the side of a square inscribed in it (a 1 to $\sqrt{2}$ relationship). Apparently Ghiberti used this relationship – known to stonemasons and Brunelleschi at the time – to generate the total height of the tabernacle, since it equals the side of a square inscribed in a circle with a diameter equal to the pier height of Orsanmichele.¹⁷ The combined height of the statue and base in turn equals half the tabernacle height: the two lengths, then, relate rationally to one another and geometrically to the pier height (Fig. 3).¹⁸

Whereas he utilized a geometric method to relate the total height of the ensemble to its pier, Ghiberti proportioned the major tabernacle elements by means of a simple

series of rational ratios: 1:2, 1:3, 2:3, 3:4, 8:9 (Figs. 4 and 5). These ratios appear in the various *trattati dell'abbaco* – as simple numerical ratios in the practical problems of the arithmetic sections and as ratios for rectangles in the geometric sections – and some are among those used by Brunelleschi for the ground plan of S. Lorenzo.

At first glance, then, the proportions used for the *St. Matthew* ensemble appear to fall neatly within the boundaries of methods known to Florentine artists and actually in practice during the early quattrocento, representing simple, empirical solutions to the problems at hand. Those readers familiar with musical theory, however, will have noted that the series of ratios controlling the tabernacle proportions is identical to the one governing the harmonic intervals of the Greek musical scale: 8:9 represents the simple tone, 3:4 the fourth or diatessaron, 3:2 the fifth or diapente, 2:1 the octave, and 3:1 the compound consonance of an octave and a fifth (3:2:1). Moreover, they do not appear to be employed in a random manner, for when the statue on its base is fitted into its niche, and all the ratios governing the entire ensemble are expressed in terms of the lowest common denominator, 6, the following series emerges: 54, 48, 36, 27, 24, 18, 16, 12 (Fig. 6). This is part of the numerical series constituting the Pythagoreo-Platonic division of the Greek musical scale: the full series expresses mathematically all the recognized intervals of that scale.¹⁹

Unless Ghiberti's use of such a series of ratios is coincidental, it places his mathematical knowledge above that of the *scuola dell'abbaco*, for although the masters of these schools were often well-versed in the university quadrivium, which included music, they only taught practical mathematics in the *abbaco* classroom. And if Ghiberti's use of the series is deliberate, it leads us to question why the Pythagoreo-Platonic ratios are employed for the *St. Matthew* ensemble. No similar ratios govern the proportions of earlier tabernacles on Orsanmichele, nor are they present in a core group of monumental sculptural commissions by Ghiberti,

¹⁴ Cennino d'Andrea Cennini, *The Craftsman's Handbook, The Italian "Il Libro dell'Arte"*, trans. D. V. Thompson, Jr., New York, 1954, Chap. lxx, 48. Ghiberti used Cennini's canon for figures in his first bronze door and for the *St. John the Baptist* (Seymour, in "Some Aspects of Donatello's Methods of Figure and Space Construction: Relationships with Alberti's De Statua and Della Pittura," *Donatello e il suo tempo*, Florence, 1968, 195–206, presents a different view). The figure of St. Stephen in the Louvre presentation drawing, done in Ghiberti's workshop ca. 1425, is also governed by that canon, although the actual statue, executed in 1427, is not.

¹⁵ Cf. E. Panofsky, "The History of the Theory of Human Proportions as a Reflection of the History of Styles," *Meaning in the Visual Arts*, Garden City, N.Y., 1955 (originally published as "Die Entwicklung der Proportionslehre als Abbild der Stilentwicklung," *Monatshefte für Kunstwissenschaft*, xiv, 1921, 118–219), 55–107 for the use of the nine-head canon derived from Cennini.

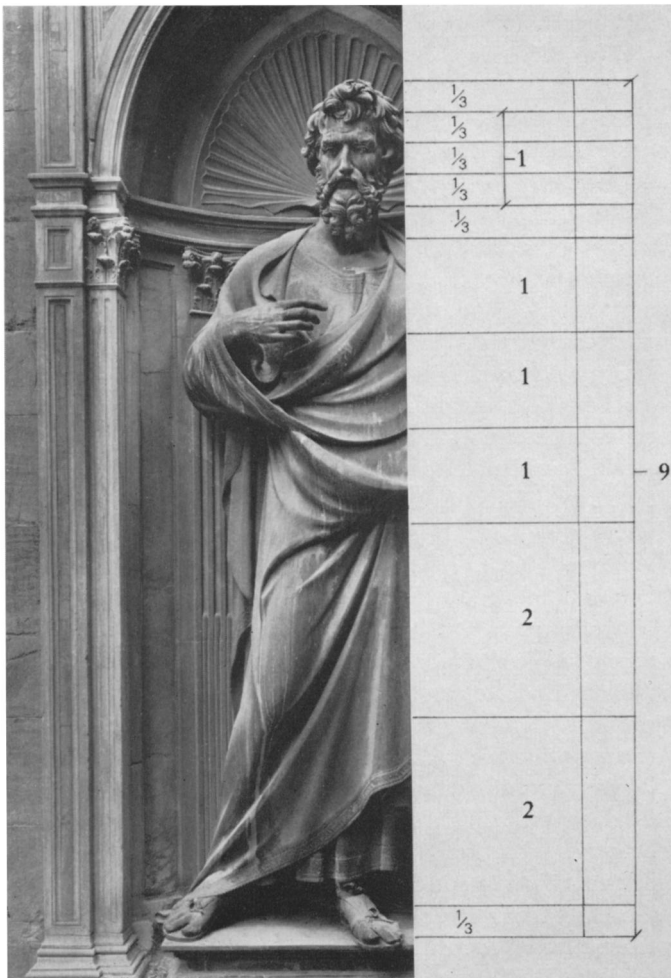
¹⁶ The statue measures 258.7cm, 3.9cm under $4\frac{1}{2}$ *braccia di panna*. This difference falls within the normal 3.25–4.0cm shrinkage in a $2\frac{1}{2}$ meter bronze statue. All of the major measurements of the *St. Matthew* ensemble are collected in the Appendix. During the trecento and quattrocento, the Florentine *braccio di panna* (58.36cm) was divided into common fractional lengths.

¹⁷ In theory this procedure is similar to that of inscribing a square within a larger one, a practice that formed the basis of the proportional system used by Northern medieval masons: cf. Frankl, *Art Bulletin*, xxvii. Northern masons, however, made use of a whole series of squares as well as the lengths of the distances between the squares when all were set with

sides parallel to one another. Ghiberti, on the other hand, did not make use of such a complex series in designing the *St. Matthew* ensemble, but only of two irrational lengths. The 1 to $\sqrt{2}$ relationship was by no means a new concept of the early quattrocento. It was employed as a proportional device by trecento Tuscan masons and panel painters (cf. Saalman, "Early Renaissance Theory," 98, n. 28 for Francesco Talenti's use of it to proportion the piers of S. Maria del Fiore in 1357, and White, "Duccio's *Maestà*," I, 357ff. and "Carpentry and Design in Duccio's Workshop: the London and Boston Triptychs," *Journal of the Warburg and Courtauld Institutes*, xxxvi, 1973, 92–105, for its presence as a design technique in Duccio's workshop).

¹⁸ The practice of using half the total tabernacle height for that of the statue and base appears to have been a standard one for the Orsanmichele ensembles: cf. D. F. Zervas, "Systems of Design and Proportion Used by Ghiberti, Donatello and Michelozzo in their Large-Scale Sculptural Ensembles between 1412–34," Ph.D. diss., Johns Hopkins University, 1973, Chaps. 1, 3.

¹⁹ Interestingly enough, the module for this series is 10.08cm, 3.6mm over $\frac{1}{2}$ *braccio* (9.726cm), a third of the face length of *St. Matthew*. It thus closely approximates the module suggested by Cennini for controlling the proportions of structures related to the main figures in a composition, although here the total height of figure and base was divided by 27 to provide the module, instead of the height of the figure alone. The module is also close to the width of the inner, partial pilaster strips of the tabernacle (9.7cm left, and 9.2cm right). For Cennini's method, see Cennini, Chap. xxx, 17.



2 Ghiberti, *St. Matthew*, with measurement in faces. Florence, Orsanmichele (photo: Alinari)

Donatello, and Michelozzo in the years immediately following the ensemble's design.²⁰ They do not appear in quattrocento theoretical literature until Alberti's discussion of them in *De re aedificatoria* (ca. 1443–52). The probable reasons for their use are best considered in terms of (1) the pre-Albertian literary sources containing the Pythagoreo-Platonic ratios; (2) the significance of the ratios for the *St. Matthew* ensemble; and (3) the most logical means by which Ghiberti could have known about them and their significance. Such concerns reach beyond the confines of purely practical proportional matters: they belong to the realm of early quattrocento religious ideas.

II

Plato's *Timaeus* is the earliest written source for the Pythagoreo-Platonic series of ratios. There, in his account of the

world's creation, Plato uses it to determine the proportions of the world soul, the "ruler and mistress" of the world body, "in origin and excellence prior to and older than the [world] body."²¹ Beginning the series of ratios with 1, Plato squares and cubes 2 and 3, the first even and odd numbers following 1, thereby generating two geometric sequences: 1, 2, 4, 8 and 1, 3, 9, 27. He completes the series by inserting the harmonic and arithmetic means between each of the terms in the two geometric sequences.²² When the resultant two groups of numbers are combined and converted into whole numbers, the complete series of ratios governing the world soul becomes 6, 8, 12, 16, 18, 24, 27, 32, 36, 48, 54, 81, 108, 162.

After proportioning the world soul, Plato describes it: "[It] partakes of reason and harmony, and being made by the best of intellectual and everlasting natures, is the best of things created."²³ The use of the word *ἀρμονίας* is significant, for although Plato never explicitly states it, the ratios he employs for the world soul are precisely those that mathematically express the intervals of the Greek musical scale. The Greeks had credited Pythagoras with the discovery that all the musical intervals could be found mathematically by the three means, the geometric means determining the octaves, and the harmonic and arithmetic means generating the fourths, fifths, and tones.²⁴ The ratios governing the Timaeian world soul, therefore, are determined according to the infallible rules of harmony set forth by Pythagoras, and for this reason are called the Pythagoreo-Platonic ratios.

The *Timaeus* was transmitted through the Middle Ages by a number of sources: two primary ones were Chalcidius's fragmentary Latin translation (breaking off at the end of paragraph 53b) and commentary, and Macrobius's *Commentary on Scipio's Dream*, which contains general references to it. In both, the Pythagoreo-Platonic ratios of the world soul are fully described and their dependence on the laws of musical harmony explicitly stated, often supplemented by elaborate explanatory diagrams (Fig. 7).²⁵

Another important source for the transmission of Timaeian ideas was St. Augustine. At a number of places in *De civitate dei* he emphasizes the parallels between the Timaeian and biblical creation:

... the book of Genesis begins with the words: "In the beginning God created the heaven and the earth. And the earth was invisible and without form, and darkness was over the abyss, and the spirit of God moved over the waters." Moreover, in the *Timaeus*, his treatise on the formation of the universe, Plato says that God in this operation first united earth and fire. But it is clear that he assigns to fire the reign of heaven. So this opinion bears a

²⁰ Zervas, "Systems of Design," contains discussions of the proportions of Donatello's *St. Louis*, *St. Peter*, and S. Croce tabernacles, and of the joint Donatello-Michelozzo projects, the Coscia and Brancacci Tombs and the Prato outdoor pulpit. A study of the proportions of the *St. Louis* and S. Croce tabernacles, and the Coscia monument, is forthcoming.

²¹ *The Dialogues of Plato*, Vol. 3: *Timaeus and Other Dialogues*, trans. Benjamin Jowett, London, 1970, 238 (*Timaeus* 34c).

²² *Ibid.*, 238 (*Timaeus* 35b–36b). The series is not actually converted into whole numbers in the text of the *Timaeus*, but left in the following terms: 1, 4/3, 3/2, 2, 8/3, 3, 4, 9/2, 16/3, 6, 8, 9, 27/2, 18, 27. Medieval versions

of the text, however, did transform the series into whole number form: see below, note 25.

²³ *Ibid.*, 240 (*Timaeus* 27a).

²⁴ Cf. R. Wittkower, *Architectural Principles in the Age of Humanism*, New York, 1965, 103–04.

²⁵ For the influence of Chalcidius and Macrobius on medieval art, see H. Bober, "In Principio, Creation Before Time," *De Artibus Opuscula XL, Essays in Honor of Erwin Panofsky*, New York, 1961, 13–28; O. von Simson, *The Gothic Cathedral*, New York, 1962, 25–58.

certain resemblance to the statement: "In the beginning God created the heaven and the earth." Next Plato speaks of the two elements, water and air, which by their intermediate position form a bond between the two extremes. This prompts the thought that he so understood the scriptural words: "The spirit of God moved over the waters." I mean that he did not note accurately what term Scripture usually employs for the Spirit of God, and because air too is called spirit, it may be thought that he supposed that the four elements are mentioned in this text.²⁶

... for Plato ... with his great authority represents God as fashioning the world on numerical principles. And in our own scripture we read the words addressed to God: "Thou hast ordered all things by measure and number and weight."²⁷

He also discusses the Timaeon world soul:

Plato holds the view that this soul of Jupiter [world soul] spreads and extends by musical ratios from the earth's innermost core or centre, as it is called by the geometricians, through all its parts to the highest and furthest reaches of heaven. And thus, according to him, this universe is an everlasting living thing of the greatest magnitude and happiness, for its soul possesses the perfect bliss of wisdom and does not abandon its own body, while the body is forever animated by the soul, and although it is not simple, but composed of so many large bodies, has no power to make the soul sluggish or slothful.²⁸

St. Augustine's equation of the Pythagoreo-Platonic ratios of the Timaeon world soul and the order and harmony of the cosmos created by the Christian Godhead (Christ-Logos²⁹) at the beginning of time was one that was picked up and elaborated on by Western ecclesiastics throughout the later Middle Ages.

St. Matthew and his Gospel were related to the account of the Creation by medieval biblical exegesis. Through the doctrine of concordance they were associated with Moses and the Book of Genesis. Genesis was known as the book of Generations, since it contains the account of the Creation of the world, as well as the genealogies of Cain, Seth, and Noah. St. Matthew's Gospel was also called the Book of Generations, since its opening chapter contains the genealogy of Christ, followed by the account of the Incarnation – the Word made Flesh.³⁰ Thus the book displayed by Ghiberti's statue is turned to the opening verses of Matthew 1:1, with the words "Liber generationis" appearing as the title on the upper left leaf (Fig. 1).

Further concordances are provided by the special nature of St. Matthew, his Gospel, and his mission. According to St. Jerome, Matthew was held to be a Jew, a publican named Levi. He wrote his Gospel in Hebrew during his ministry in Palestine. The purpose of his mission in the Holy Land was to strengthen the faith of the Jews who had believed in Christ.³¹ His Gospel was thus particularly intended to demonstrate the fact that Christ is indeed the Messiah prophesied and promised in the Old Testament, the true Son of God, the founder of the messianic reign, the perfection of the Old Law.³²

Origen's Second Book of Commentary on St. Matthew's Gospel contains a particularly striking example of the concordances between the Old and New Testaments expressed in explicit musical terms:

... the Word is the one Shepherd of things rational which may have an appearance of discord to those who have not ears to hear, but are truly at perfect concord. For as the different chords of the psalter or the lyre, each of which gives forth a certain sound of its own which seems unlike the sound of another chord, are thought by a man who is not musical and ignorant of the principle of musical harmony, to be inharmonious, because of the dissimilarity of the sounds, so those who are not skilled in hearing the harmony of God in the sacred Scriptures think that the Old is not in harmony with the New, or the Prophets with the Law, or the Gospels with one another, or the Apostle with the Gospel, or with himself, or with the other Apostles. But he who comes instructed in the music of God ... will bring out the sound of the music of God, having learned from this at the right time to strike the chords, now the chords of the Law, now the Gospel chords in harmony with them, and again the Prophetic chords, and when reason demands it, the Apostolic chords which are in harmony with the Prophetic, and likewise the Apostolic with those of the Gospels. For he knows that all the Scripture is the one perfect and harmonized instrument of God, which from different sounds gives forth one saving voice to those willing to learn ...³³

Such concordances occur frequently in patristic literature, and they are also present in less sophisticated Italian writings. Jacopo da Voragine's *dugento* life of St. Matthew in the *Legenda sanctorum* contains a parallel between the primeval paradise described in Genesis and the celestial one promised in the saint's Gospel: it forms one of his essential messages: "Then the apostle preached a wondrous sermon to the people concerning the earthly paradise.

²⁶ St. Augustine, *The City of God Against the Pagans*, trans. E. M. Sanford and W. M. Green, Cambridge, 1965, III, 53 (Bk. VIII, para. XI).

²⁷ *Ibid.*, IV, 91 (Bk. XII, para. XIX). Also see E. R. Curtius, "Gott als Bildner," *Europäische Literatur und Lateinisches Mittelalter*, Bern, 1948.

²⁸ St. Augustine, *City of God*, VI, 197 (Bk. XIII, para. XVI).

²⁹ See Bober, "In Principio," 25–28, for a discussion of Christ-Logos as the Creator.

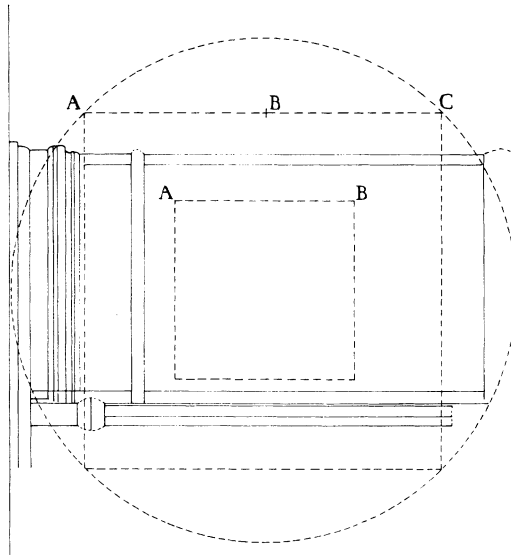
³⁰ H. de Lubac, *Exégèse médiévale*, Paris, 1959, 328–355; *Matthew*, intro., trans. and notes by W. F. Albright and C. S. Mann, New York, 1971, 1–6. For this tradition in the arts, see E. Wind, "Michelangelo's Prophets and Sibyls," *Proceedings of the British Academy*, LI, 1960, 47–84; I. Lavin, "Divine Inspiration in Caravaggio's Two St. Matthews," *Art Bulletin*,

LVI, 1974, 61ff.

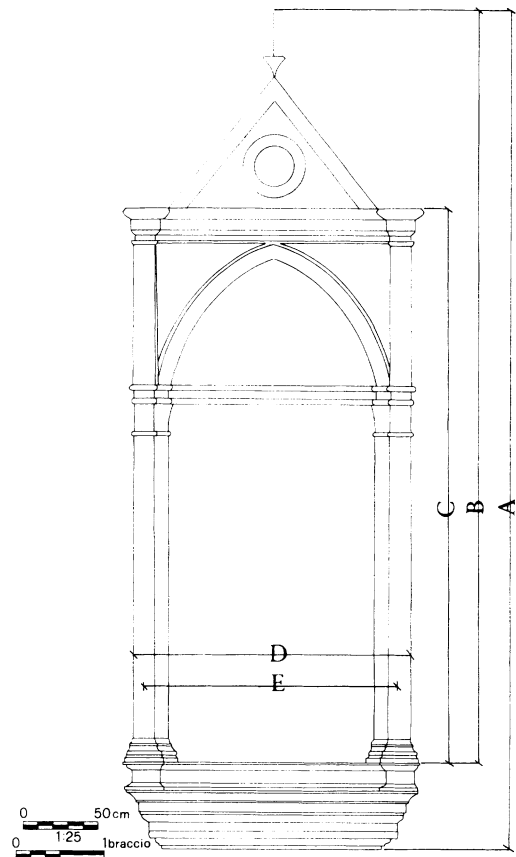
³¹ St. Jerome, "Preface to the Commentary on the Gospel of St. Matthew," in Migne, *Patrologiae Cursus Completus. Series Latina*, 221 vols., Paris, 1844–77, xxvi, 18; G. D. Kilpatrick, *The Origins of the Gospel According to St. Matthew*, Oxford, 1946.

³² P. de Ambroggi, "S. Matteo," *Enciclopedia Cattolica*, Vatican City, 1952, VII, 493.

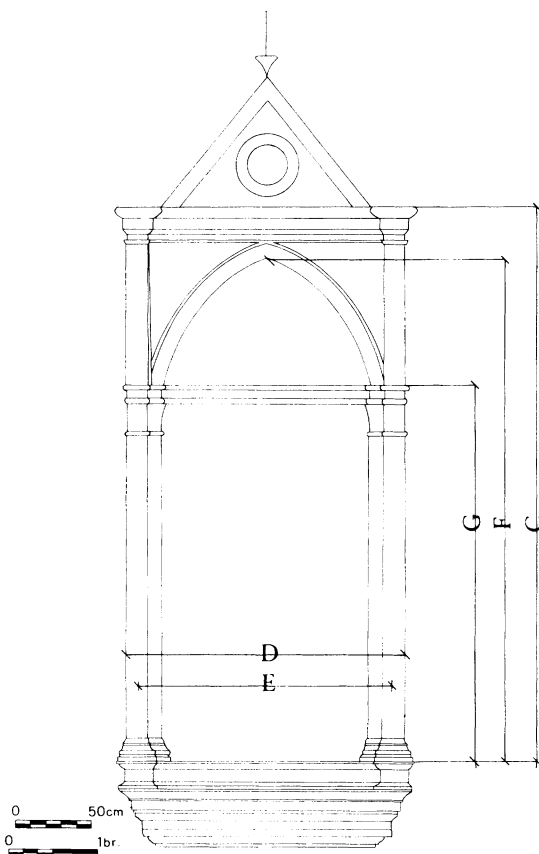
³³ "The Second Book of the Commentary on the Gospel According to Matthew, Book II," *The Ante-Nicene Fathers, Translations of the Writings of the Fathers down to A.D. 325*, suppl. to American ed., Grand Rapids, 1969, X, 413; Lubac, *Exégèse médiévale*, 330–31, traces the continuity of the "harmonic" tradition in the writings of the Church Fathers.



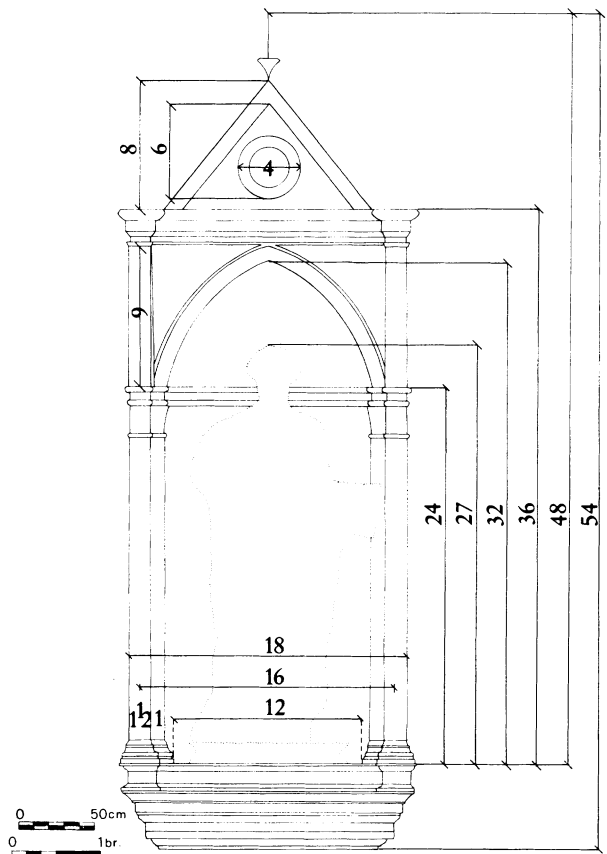
3 Geometrical method used to generate *St. Matthew* Tabernacle's height (ABC) and statue-base height (AB)



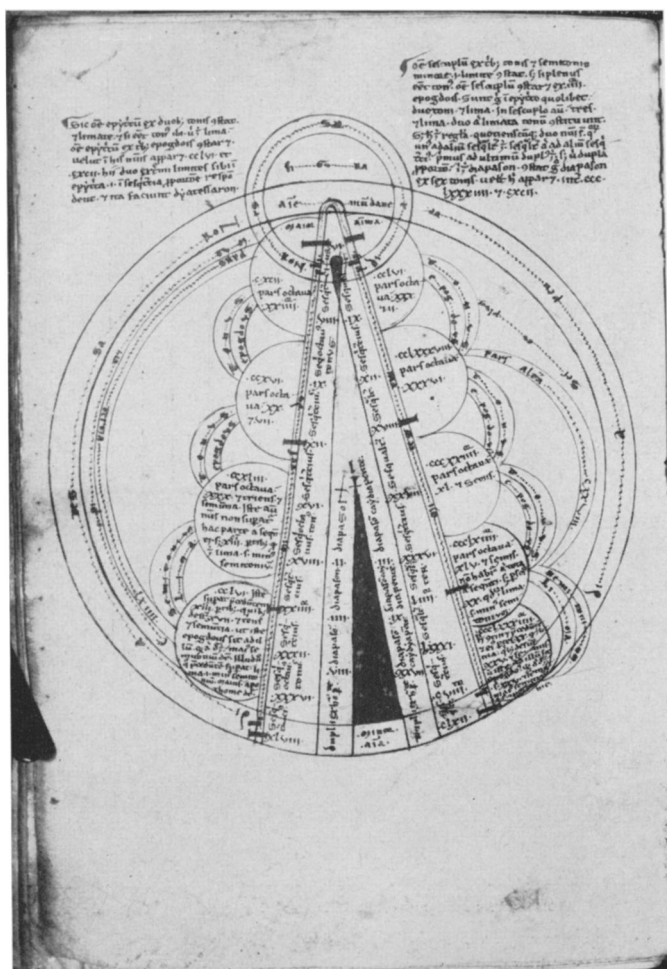
4 Ratios controlling proportions of *St. Matthew* Tabernacle (I). A:B=9:8; B:C=4:3; C:D=2:1; A:C=3:2; A:D=3:1; B:E=3:1



5 Ratios controlling proportions of *St. Matthew* Tabernacle (II). C:F=9:8; F:G=4:3; G:D=4:3; G:E=3:2; C:G=3:2



6 Pythagoreo-Platonic Ratios Governing *St. Matthew* Ensemble



7 Ratios Governing the World Soul, *Plato Timaeus Calcidii* (12th-century manuscript owned by Niccolò Niccoli), fol. 61v. Florence, Bibl. Naz., Cod. Con. Supp. I, II, 50.

He said that it was higher than all mountains and near to Heaven; no thorns or brambles grew therein, nor did the lilies and the roses wither; there was no old age, all men remaining ever young; there angels made sweet music, and the birds came at one's call. He said that man had been driven out of the earthly paradise, but that by the birth of Christ all were called again to the heavenly Paradise."³⁴

III

In the early quattrocento, anyone familiar with the above sources – Plato's *Timaeus*, Genesis, St. Matthew's Gospel, St. Augustine's *De civitate dei*, the commentaries on the Gospel of St. Matthew by Origen and St. Jerome, and Voragine's *Legenda sanctorum* – would understand that the same

laws of order and harmony governing the creation of the cosmos and functioning in the original, earthly paradise of the Garden of Eden, would necessarily function in the celestial paradise as well: the two were part of one and the same order and harmony ordained by God at the time of the Creation. He would also comprehend why it would be particularly suitable for those laws – the Pythagoreo-Platonic ratios – to be used for the proportions of the tabernacle housing the image of St. Matthew, whose particular mission it had been to reconcile the differences and point out the continuities between the Old and New Law, and whose Gospel announced the arrival of the New Church, which replaced and yet was the logical extension of both the older churches of the Gentiles and the Jews.

The "new" visual elements of the *St. Matthew* ensemble, the Classically-inspired figure of the saint and tabernacle architecture, together with the presence of sibyls – the Classical antecedents of the Old Testament prophets – on the tabernacle pediment,³⁵ suggest that Ghiberti was familiar or was made familiar with the harmonizing nature of St. Matthew as Evangelist. Whether he himself was acquainted with all the sources listed above is problematic. As a religious layman, he undoubtedly knew Voragine's *Legenda sanctorum*, which remained a popular work on the saints' lives throughout the quattrocento, and he probably understood general biblical concordances, which appeared often in the course of sermons and homilies said during the Mass.³⁶ Ghiberti could read and write Latin, and his *Commentarii* bear witness to the wide range of works he had read by the 1440's. We cannot be absolutely certain, however, that his reading interests extended to patristic literature, or if he even had the time for such interests at the busy stage of his career when the *St. Matthew* ensemble was designed.

On the other hand, there was a Florentine humanist, Niccolò Niccoli, who was well-versed in such matters. Niccoli took a lively interest in the visual arts. From Guarino Veronese's invective of 1413 against him, we know that he studied ancient architecture: "... This man, in order to appear also to expound the laws of architecture, bares his arm and probes ancient buildings, surveys the walls, diligently explains the ruins and half-collapsed vaults of destroyed cities, how many steps there were in the ruined theatre, how many columns either lie dispersed in the square or still stand erect, how many feet the basis is wide, how high the point of the obelisque rises."³⁷

Vespasiano mentions that Niccoli particularly favored the works of Brunelleschi, Donatello, Luca della Robbia, and Ghiberti, and that he was on intimate terms with them.³⁸ His name, along with that of Ambrogio Traversari,

³⁴ Jacobus de Voragine, *The Golden Legend*, trans. G. Ryan and H. Ripberger, New York, 1969, 562.

³⁵ For the tradition of these figures as sibyls, see Seymour, *Sculpture in Italy*, 72.

³⁶ The accounts of the saints' lives contained in Voragine's *Legenda sanctorum* are thought to be popularized versions of works contained in the Lectionaries, which were read during Mass as the various feasts occurred throughout the year: Jacobus de Voragine, *The Golden Legend*, VIII.

³⁷ Guarino Veronese, *Epistolario*, ed. R. Sabbadini, Venice, 1915, I, 39–40. For Niccoli see G. Zippel, *Niccolò Niccoli*, Florence, 1890, and E. H. Gombrich, "From the Revival of Letters to the Reform of the Arts," *Essays in the History of Art Presented to Rudolf Wittkower*, London, 1967, 71–82.

³⁸ Vespasiano da Bisticci, *Renaissance Princes, Popes and Prelates: The Vespasiano Memoirs: Lives of Illustrious Men of the XV Century*, trans. W. George and E. Waters, New York, 1963, 395–403.

has been convincingly linked with the program for Ghiberti's east Baptistery door in 1425.³⁹ More importantly, at the time of the *St. Matthew* commission, Niccoli was extremely close to one of the four *Operai* elected by the *Arte di Cambio* to select the artist and supervise the work: Cosimo de' Medici.⁴⁰ About twenty-five years his senior, Niccoli seems to have entered into a friendship with Cosimo early in the quattrocento; by 1418 they were intimate enough to have planned a trip to Palestine together.⁴¹

The Medici appear to have taken a personal interest in the *St. Matthew* ensemble. In 1420, Cosimo's father, Giovanni di Bicci, advanced 296 *florins* for 3000 pounds of bronze purchased in Venice for the statue.⁴² In 1422 Cosimo reported to the *Operai* that the *St. Matthew* had been successfully cast.⁴³ At the same meeting, the *Operai* allotted 200 *florins* for the cleaning, chasing, and setting up of the statue, and for the decoration of the niche. Approximately three months later, in May 1422, the contract for the tabernacle was signed.⁴⁴

Niccolò Niccoli would have been a perfect source from whom to learn about the significance of the Pythagoreo-Platonic ratios, should Ghiberti not have known about them on his own. Niccoli is usually cited as the "reviver of Greek and Latin letters in Florence,"⁴⁵ but he was also familiar with patristic literature. Throughout his life he remained a devoted, practicing Christian. Vespasiano repeatedly stresses this point in his account of Niccoli, and Lorenzo Valla, in the third book of his dialogue *De voluptate*, ca. 1431, appoints Niccoli the spokesman for Christian morals.⁴⁶ From his earliest years he had moved in the circles of the theologian-humanists. He received his first intellectual training from Luigi Marsigli, the famed friar of the Augustinian convent of S. Spirito; he remained one of Marsigli's devoted disciples, maintaining close contact with S. Spirito throughout his life, and was buried there as well.⁴⁷ Under Marsigli's influence, S. Spirito had become a center for religious, philosophical, and Classical discussions during the last decades of the trecento. These continued after Marsigli's death in 1394, attended by men such as Niccoli, Leonardo Aretino, Roberti de' Rossi, and Giovanni Lorenzo.⁴⁸ Niccoli was also friendly with Coluccio Salutati, an enthusiastic reader of Augustine's works. And he was the confidant-advisor of Ambrogio Traversari, the learned and devout theologian-humanist of the Camaldolese monastery of S. Maria degli Angeli. Traversari himself was

interested in patristic literature and knew the writings of all the available Greek and Latin Fathers.⁴⁹

The possibility that Ghiberti learned of the appropriateness of the Pythagoreo-Platonic ratios for the *St. Matthew* ensemble from Niccoli directly, or through the mediating force of Cosimo de' Medici, is given added strength by a survey of the humanist's personal library.⁵⁰ Only 403 of the some 800-odd manuscripts in Niccoli's collection actually entered S. Marco at his death in 1437. These included four copies of Chalcidius's translation and commentary on the *Timaeus* (illustrated with diagrams of the world soul: Fig. 7), plus one each of Macrobius's *Commentary on Scipio's Dream*, Boethius's *De arithmetica* and St. Augustine's *De musica*. Sixteen volumes of Scripture have survived, including two glossed versions of Genesis and the Gospel of St. Matthew. Sixty-three manuscripts of patristic writings attest to his interest in that subject, including thirty-four by St. Augustine, eight by St. Jerome, six by St. Gregory the Great, five by Origen, four by St. Hilary of Poitiers, and three each by Tertullian and Ambrose. His collection of St. Augustine's writings alone is staggering. The extant manuscripts from Niccoli's collection do not include St. Augustine's *De civitate dei* or St. Jerome's commentary on St. Matthew's Gospel, but it is possible that they were among those lost in 1437: even if he did not own them himself, he could have easily borrowed them from friends.

IV

The methods suggested for the design and proportions of the *St. Matthew* ensemble appear to place it squarely at the crossroads of medieval and Renaissance systems in Florence. On the one hand, the statue's proportions seem to confirm the use of a system similar to the one outlined by Cennino Cennini and based on Tuscan painters' workshop practices of the late trecento. To a certain extent, the ensemble's general proportions suggest the use of practical methods as well: the two most important overall heights appear to be derived by methods used by stonemasons, and the tabernacle appears to be proportioned by simple rational ratios appearing frequently in *abbaco* texts of the period. On the other hand, the suggested use of the complex series of Pythagoreo-Platonic musical ratios to control all the ensemble proportions marks a significant departure from earlier Tuscan workshop practices – or at least from what we now accept as common workshop practices. It would

³⁹ Krautheimer, *Ghiberti*, 174–87.

⁴⁰ *Ibid.*, 405. Cosimo de' Medici was also a member of the *Compagnia d'Orsanmichele*, and served as one of its *Capitani* from August through November 1418, one year prior to the commissioning of the *St. Matthew* ensemble: cf. Florence, Archivio dello Stato, *Orsanmichele* 25, fol. 43v.

⁴¹ For Niccoli's friendship with Cosimo and the Medici family, cf. Zippel, *Niccolò Niccoli*, particularly 24, 53–55, 63ff.

⁴² Krautheimer, *Ghiberti*, 406.

⁴³ Niccoli was also in Florence that year: copies of the *Orator* and *Brutus*, discovered by Gerardus Landrianus at Lodi in 1421, were taken to him in Florence by Giovanni di Corvini in April 1422: M. E. Cosenza, *Biographical and Bibliographical Dictionary of the Italian Humanists in Italy, 1300–1800*, Boston, 1962, III, 2466.

⁴⁴ Krautheimer, *Ghiberti*, 407.

⁴⁵ Vespasiano da Bisticci, *Renaissance Princes*, 400.

⁴⁶ "In Tertio (qui solus lectione Christiani hominis dignus) Nicolaus

Nicolus de falso veroque bono disputat: Christianam fidem commendat et voluptatem celestem commemorat." L. Valla, "De Vero Falsoque Bono," ed. M. Lorch, Bari, 1970, XI, xxxv.

⁴⁷ Vespasiano da Bisticci, *Renaissance Princes*, 395–403; Zippel, *Niccolò Niccoli*, 11–14.

⁴⁸ *Ibid.*; U. Mariani, *Il Petrarca e gli Agostini*, Rome, 1946, 66–96, also discusses the influence of Luigi Marsigli. For the importance of St. Augustine in the quattrocento, see P. O. Kristeller, "Augustine and the Early Renaissance," *Studies in Renaissance Thought and Letters*, Rome, 1956, 355ff.

⁴⁹ Zippel, *Niccolò Niccoli*, 26–7.

⁵⁰ B. L. Ullman and P. A. Stadter, *The Public Library of Renaissance Florence: Niccolò Niccoli, Cosimo de' Medici and the Library of San Marco*, Padua, 1972, 62–76, provide a list of the books in Niccoli's library: Chapter II contains an excellent discussion on Niccoli's collection of manuscripts and its importance.

appear to serve a special, twofold function in the ensemble's design. Intellectually it emphasizes the message of St. Matthew and his Gospel – the harmony between the Old and New Law that had been pre-ordained from the moment of Creation – a message familiar to Florentine society, and above all to the members of the saint's guild, the *Arte di Cambio*. Visually, the series of ratios would appear to be responsible for the work's strong aura of balanced, self-contained harmonies. Ghiberti's use of the Pythagoreo-Platonic ratios would comply with Alberti's rules for well-proportioned architecture, although it would anticipate them by at last twenty-four years: "... The same Numbers, by means of which the Agreement of Sounds affects our Ears with Delight, are the very same which please our Eyes and our Mind. We shall therefore borrow all our Rules for the finishing of our Proportions from the Musicians, who are the greatest Masters of this Sort of Numbers."⁵¹

The *Arte di Cambio* had displayed great care and pride in the *St. Matthew* commission from the moment of its inception, viewing it as a competition piece with the *Arte di Calimala*'s earlier ensemble on Orsanmichele, which had been executed in part by Ghiberti himself.⁵² The Classicized image and slightly larger scale of *St. Matthew*, the modern tabernacle, and the proportions governing the ensemble gave the Bankers' Guild a unique, even avant-garde work at the time of its completion, one that must have enhanced the Guild's civic image. And whether Ghiberti himself was familiar with the Pythagoreo-Platonic ratios, or learned of them directly from Niccoli or through Cosimo, his proposed use of them suggests that the subject of design and proportion in Florence was beginning to rise above the level of simple, workshop practices in sculpture as well as in architecture during the early 1420's. It was becoming an area of experimentation, and possibly a topic for dialogues between artist and patron, artist and humanist. In 1422, moreover, when many proportional practices in architecture were still bound by functional considerations and medieval concepts of statics, the *St. Matthew* ensemble, owing to its decorative, non-functional nature, would have provided a perfect medium for experimentation.

Mount Holyoke College

Appendix

Correlations between the Dimensions of the *St. Matthew* Ensemble and the Pythagoreo-Platonic Musical Ratios

	Cm	Braccia	Ratio*	% of Error†
1. Total tabernacle height	544.5	9 $\frac{1}{2}$ (544.7)	54 (544.5)	—
2. Tabernacle height minus base	488.0	8 $\frac{1}{2}$ (486.2)	48 (484.0)	+ .8%
3. Height from pier plinth to cornice	362.1	6 $\frac{1}{4}$ (364.7)	36 (363.0)	— .02%
4. Height from pier plinth to point of niche arch	327.5	5 $\frac{7}{12}$ (325.8)	32 (322.7)	+ 1.4%
5. Height of <i>St. Matthew</i> plus base	272.7	4 $\frac{2}{3}$ (272.3)	27 (272.3)	+ .2%
6. Height of pier plus impost block	245.9	4 $\frac{1}{8}$ (243.2)	24 (242.0)	+ 1.61%
7. Distance between outer edges of piers	181.0	3 $\frac{1}{12}$ (179.9)	18 (181.5)	— .27%
8. Clear intercolumniation of piers	166.4	2 $\frac{10}{12}$ (165.4)	16 (161.4)	+ 3.0%
9. Distance between inner edges of pilaster bases framing niche	121.4	2 $\frac{1}{8}$ (121.6)	12 (121.0)	+ .3%
10. Height of pier framing arch section	90.4	1 $\frac{7}{12}$ (92.4)	9 (90.7)	— .3%
11. Height of triangular pediment	81.9	1 $\frac{5}{12}$ (82.6)	8 (80.7)	+ 1.46%
12. Distance from bottom of circle in pediment to pediment molding	59.5	1 (58.3)	6 (60.5)	— 1.65%
13. Outer diameter of pediment circle	40.1	$\frac{2}{3}$ (38.9)	4 (40.4)	— .6%
14. Width of pier shaft, left	14.6	$\frac{1}{4}$	1 $\frac{1}{2}$	— 3.3%
right	14.2	(14.6)	(15.1)	— 5.9%
15. Width of partial pilaster shaft, left	9.7	$\frac{1}{8}$	1	— 3.7%
right	9.2	(9.7)	(10.026)	— 8.7%

*Module for ratios is 10.08cm, 3.6mm over $\frac{1}{8}$ braccio, one third of the statue face.

†Between real dimensions and ideal dimensions governed by the Pythagoreo-Platonic ratios.

⁵¹ Alberti, *Ten Books on Architecture*, 196–97.

⁵² Krautheimer, *Ghiberti*, 86.