

Piero and Perspective: Art and Science

by Michelle Marder Kamhi

I like a painter to be as learned as he can be in all the liberal arts, but primarily I desire him to know geometry. — *L. B. Alberti*

At the end of his treatise on painting, the first such theoretical treatise written in the Renaissance, [Leon Battista Alberti](#) concluded: “Nothing is born and perfected at once. Whoever follows me, if perhaps he is someone more advanced in learning and talent than I, will, I expect, make painting self-contained and perfect.”¹ As if in response to Alberti’s invitation to add to his work, [Piero della Francesca](#) wrote, late in life and after he had ceased his activity as a painter, [De Prospectiva Pingendi](#).

Though it cannot be said that Piero’s treatise made of painting something “self-contained and perfect,” for he treated only one of the three elements of painting discussed by Alberti (*circonscrizione*, *composizione*, and *rezezione di lumi*), it is generally acknowledged that Piero brought to the subject of perspective (he used the word *commensuratio*, a more precise term than Alberti’s *composizione*) a thoroughness and mathematical rigor it had not had before. Vasari commented that in the sciences of geometry and perspective Piero was inferior to no man of his time, and that his books “have deservedly acquired for him the name of the best geometrician of his time.”² Fra Luca Pacioli, a close friend of the painter and an accomplished mathematician in his own right, reported that the great Leonardo himself abandoned his plan of writing a treatise on perspective when he saw the excellence of Piero’s.³ The truth inherent in this report is confirmed in our own day: in the opinion of Professor Rudolf Wittkower, Leonardo’s notes on perspective “lack the coherence and consistency of Piero’s treatise and are probably less original than is generally assumed.”⁴

While no one appears to dispute the contribution Piero made to the study of perspective *per se*, there is disagreement among critics about the bearing of the treatise upon Piero’s painting. Is there a direct connection between his theory and his practice? Does the scientific treatise help us to understand his art? In his monograph on Piero, Sir Kenneth Clark suggests that the treatise does help to elucidate the artist’s intentions.⁵ Another critic argues that “Piero’s book on perspective, severely mathematical, does not help us to formulate his art. . . . Piero’s theoretical writings mislead in the matter, for he wrote only of values responsive to rule, to scientific rule.”⁶

If we turn to the treatise itself,⁷ hoping for the elucidation promised by Sir Kenneth, we are

bound to be discouraged. It is “severely mathematical,” or so it seems at first. It is not concerned with general theories about art or aesthetics. By contrast with Alberti’s treatise, there is no attempt at a definition of beauty. Piero concentrated on the mechanical problem of the accurate projection of images of three-dimensional objects onto a picture plane. Though he selected particular numerical values to clarify his geometrical demonstrations, these values are essentially arbitrary and do not appear to indicate an aesthetic value judgement on his part. Among the many [diagrams he included with the text](#) [scroll right] are several which recall parts of his paintings, but nowhere in the treatise did he make specific reference to his own artistic production. Though his careful perspective diagrams help us to understand his technique, they do not seem to shed light on the “idea” of his art.

In a rare departure from the mechanics of the problem at hand, Piero interpolates this comment:

Therefore, I say perspective is necessary; because as a true science it distinguishes degrees of size in proportional terms, by showing the foreshortening and enlarging of every size dimension by means of lines. Observing this perspective many ancient painters acquired eternal fame, like Aristomenes of Thasos, Polycles, Apelles Andramides, Nitheusm Zeuxis, and many others. Although many without having used perspective are given praise, this has been done with poor judgment by those who have no knowledge of the possibility of art. Therefore, zealous for the glory of art in this age, I have dared presumptuously to write this small part of perspective pertaining to painting.⁸

But even from this passage it is difficult to glean more than the fact that the artist considered perspective an essential part of the art of painting, a conclusion we might very well have deduced just from the fact that he wrote the treatise at all. He does not reveal why he considered perspective important.

For some insight into the role perspective plays in the art of Piero, the excellent introduction to the critical edition of *De Prospectiva*, by [G. Nicco Fasola](#), is far more illuminating than the words of the treatise. Analyzing several of Piero’s most important works, Nicco Fasola shows how the artist varied his perspective scheme, adapting it in each case to serve the expression of the subject represented.²

In the [Solomon and Sheba](#) episode of the Arezzo cycle—Nicco Fasola points out—the vanishing point of the righthand scene coincides with the position of the wood of the True Cross, toward which the procession in the lefthand section of the picture is oriented. Whereas Alberti had proposed as a rule of thumb (which was accepted by many Quattrocento artists), the [Dream](#)

placement of a painting's central vanishing point at the height of the eyes of the figures, Piero's apparent vantage point was much lower, not only in this fresco but in nearly all his other works as well. Alberti's recommendation was probably related to his desire "to create an emotive link between the observer and the painting by means of a perspective construction which locates observer and observed in the same apparent space."¹⁰ In the case of a fresco located high above an observer's head, however, a high apparent vantage point within the fresco would create a very artificial effect.¹¹ Perhaps more important for Piero's purposes, a lowered vantage point lends greater monumentality to the figures in the first plane of the picture. The ground plane is sharply foreshortened and the foreground figures stand out impressively before their architectural or landscaped backdrops. Their scale nobly augmented by perspective, they dominate the frescoes in a friezelike manner very appropriate to the ceremonial procession depicted. As Nicco Fasola also notes, the location of the vanishing point in the Solomon and Sheba fresco has an added function of unifying the two scenes of the narrative. "The compositional and representational focus of one scene is the perspective focus of the other."¹² The two different moments in time are thus linked formally, and the eye is led to the principal object in the fresco by the converging lines of the architectural background seen in perspective.

An even better illustration of the subtlety of Piero's manipulation of perspective is provided by his *Resurrection*. Adopting the basic format of a local iconographic tradition for showing the risen Christ,¹³ Piero transformed the traditional image in such a way as to make the mystery of the Resurrection explicit in rational terms.¹⁴ He clarified what had been a flattened, jumbled mass of figures in the [earlier work by a local artist](#), to create an extraordinarily sculptural group whose position in space is clearly related to a single vantage point, at approximately the height of the sarcophagus rim. That this is the vantage point intended for the lower half of the picture is made clear by the painted frame of Corinthian columns on either side of the fresco [as can be seen [here](#)]. These columns, which unfortunately were covered over for some time and appear in very few photographs of the work,¹⁵ contribute considerably to its spatial effect. The strong sense of recession into depth created by the columns and the group of sleeping soldiers is a powerful foil for the frontal figure of Christ. The awesomely hieratic figure of the Savior is represented with reference to another, higher vantage point, level with his head. The introduction of this second vantage point was, in one sense, a departure from a strictly rational method on Piero's part: in actuality, no one can view a given scene simultaneously from two different positions. But Piero was not a "naturalist"; and the use of two vantage points was symbolically appropriate to the miraculous subject matter of the fresco, since a miracle, by definition, transcends natural laws. Like his superhuman stride out of the grave, Christ's relation to a separate vanishing point may be taken as an expression of his divinity.

In the wide difference between Piero's use of perspective in the *Solomon and Sheba* fresco

and the *Resurrection* is evidence that perspective was never reduced to a technical formula by him in his paintings. For each subject, he varied his construction. In the *Dream of Constantine*, four different vanishing points have been identified, and a good deal of the poetry of this painting has been ascribed to its unusual perspective. To these examples offered by Nicco Fasola can be added others. In the *Uffizi diptych*, Piero represented the portraits of the Count and Countess of Urbino against a distant landscape, with no intermediate plane. This basic format had probably been introduced by Jan van Eyck,¹⁶ but Piero altered the motif. Whereas the northern painters had used a three-quarter view, Piero chose a profile pose. Though the profile, unlike the three-quarter view, does not invite penetration into the deep space of the landscape background, its bold contours do contribute to a far more impressive image.¹⁷ Even if it must be admitted that the use of the profile may first have been dictated by the Count's wish to hide the scarred side of his face, the fact remains that Piero could have given the portrait an interior setting. It seems likely that his choice of the landscape perspective was prompted by a desire to identify the noble couple with their domain, to represent their strong dominion over their lands, and to symbolize their "high estate."¹⁸

The painting by Piero which most seems to require an understanding of its perspective is the *Flagellation*. Of this work, Sir Kenneth Clark wrote that no other extant painting, with the possible exception of *Uccello's Deluge* [more] is "so complete an expression of the Renaissance *mystique* of measurement known as perspective."¹⁹ Much has been written about this work, perhaps more than about any other single picture by Piero, yet its iconography remains an enigma. The fact that Nicco Fasola does not discuss this painting in her introduction to the *De Prospectiva* is possibly an indication of the work's impenetrability.

In interpreting the *Flagellation*, most scholars attempt to identify the three foreground figures and relate them in some way to the flagellation scene in the background. The traditional identification of the central foreground figure as the wicked Count Oddantonio of Urbino surrounded by his two evil counsellors, Manfredo dei Carpi and Tommaso dell' Agnello, is no longer widely accepted. But more recent suggestions have proved equally unsatisfactory. To discuss all the various identifications would be somewhat outside the subject of this paper. What is very pertinent to the topic of perspective, however, is the explanation offered by Creighton Gilbert. In an article entitled "On Subject and Non-Subject in Italian Renaissance Pictures," Gilbert proposes that Piero's *Flagellation* is essentially a perspective exercise.²⁰ This conclusion he bases partly on the conviction that the three foreground figures, who have so prominent a position in the painting and thus in the interpretations of other critics, are not portraits at all.²¹ He points out their similarity to figures in other paintings by Piero, maintaining that they are simply types drawn from Piero's repertoire and that they are thus intended to represent ordinary bystanders at the Flagellation. He also shows that the placement of the Flagellation scene in deep

perspective was not unique to Piero among Quattrocento artists.²² From these observations Gilbert concludes that the foreground figures in Piero's painting have no particular identity or significance, that they are merely anonymous bystanders at this episode in the Passion and are comparable to the onlookers in Jacopo Bellini's [perspective drawing of the Flagellation](#).²³ According to Gilbert, Piero's main concern was to explore the complicated spatial relationships of figures in a rich architectural setting. As further evidence he adds the observations that the *Flagellation*, which measures only about 23 x 32 in., is rare among Piero's extants as a true "easel" painting, and that the lack of documentary evidence about this work may indicate it was done not for a commission but exclusively to satisfy the artist's artistic impulses.²⁴

Gilbert's hypothesis is a tempting one, because it would allow a neat, simple interpretation of Piero's artistic development. We could then see the painter as becoming increasingly involved with the mechanical or "scientific" problems of perspective, an involvement which would eventually draw him away from painting entirely toward the full-time pursuit of "pure science" and the writing of his three treatises. Such a course of development was implied by Sir Kenneth Clark when he wrote about Piero's probable last painting, the [Brera altarpiece](#). Sir Kenneth stated that the egg suspended from the vault behind the Virgin was the "solid realization of a conic section" and that it had come to mean more to Piero as a symbol of mathematical perfection than as a symbol of the Madonna's perfection.²⁵ As a student of solid geometry might have revealed, however, Sir Kenneth's premise was incorrect; an egg cannot be described with a conic section.²⁶ And as Millard Meiss has shown since,²⁷ Sir Kenneth's conclusion was also invalid. The Brera altarpiece's rich iconology demonstrates that Piero, even at the end of his painting career, was thinking about far more than pure mathematics. The possibility exists, of course, that what was not true of the Brera altarpiece may be perfectly valid for the *Flagellation*. The *Flagellation* certainly exhibits a far more complicated spatial organization than the later work.

In a detailed analysis of the composition of the *Flagellation*,²⁸ Professor Wittkower and B.A.R. Carter have shown that the painting's complex spatial effects were, as one would have expected, achieved through meticulous and deliberate perspective constructions. The clarity and accuracy of the painting's spatial construction are such, in fact, that Wittkower and Carter were able to derive from the painting a reasonably accurate "[model](#)" of the architecture represented in it. Furthermore, Professor Wittkower has asserted, Piero himself must have made similar model plans and elevations before representing the entire scene in perspective.

The model that Wittkower and Carter have reconstructed from Piero's *Flagellation* is characterized by the harmonious ordering of its parts. There seems to have been nothing casual or arbitrary about the painting's design. Both in depth and in two dimensions²⁹ the composition is rationally structured. "Architecture and figures are integrated into one system of spatial relationships,"³⁰ a system bound together by simple ratios (ratios of small whole numbers) of

distances and dimensions.³¹ The principal dimensions of the composition are related to an identifiable module.

Particular importance is ascribed by Wittkower and Carter to the geometric design of the inlaid pavement on which the Christ-like figure and his persecutors stand. The pattern is of an unusual intricacy, but this intricacy is seen as more than merely formal. Both the circular area beneath the Christ-like figure and the polygonal design of the surrounding pavement, probably had for Piero profound symbolic value.³² If this was indeed the case, Piero's perspective construction was not a technical exercise pursued for its own sake. It was applied to the accurate representation of geometric forms which in themselves had a special significance. His perspective "science" was at the service of his design, which was "infused with mathematical symbolism."³³

One writer has observed that Piero's perspective is not a "result of our vision, but a construction made consciously for an artistic purpose," and that "the true rapport is not between the thing seen and the eye, but between the eye and the representation."³⁴ If we turn again to Piero's treatise, we will see the truth of those observations. First, we will be reminded that Piero himself called his treatise "On the Perspective of Painting" not "On the Perspective of Vision,"³⁵ and if we feel compelled to emphasize the "scientific" character of the treatise to the prejudice of its artistic intentions, we are ignoring the direction offered by the author himself. Second, there is a fallacy in the artist's reasoning which I believe further reveals that he was not primarily interested in the relation between the "thing seen and the eye." While he recognized that the apparent size of an object depends on the visual angle within which it is seen by the eye, he nevertheless described the eye (the "power of vision") as a point:

Every quantity of size is represented in the eye within an angle. This is self-evident, because no size [dimension] exists in a point, and the power of vision [the eye] is only a point.³⁶

The obvious self-contradiction of this statement is puzzling. If the eye were a point, it could be only the apex of an angle, of any and all angles. No angle can be defined by just one point, and the eye would therefore be incapable of perceiving dimension.

In his preoccupation with the picture plane as the principal plane of intersection through the visual cone, Piero did not suspect that in the eye there is also a "plane of intersection" (the retina), upon which the formation of images approximates the perspective projection of images onto a picture plane.³⁷ It seems reasonable to assume, however, that if Piero had been really absorbed in trying to understand the anatomy of vision, the paradox of his initial proposition about the structure of the eye would not have escaped him. By logic alone he might have deduced

the existence of a “plane of intersection” in the eye. His failure to do so indicates, I think, that he was not primarily concerned with the anatomy of vision. The problem for him was the projection of three-dimensional images in such a way as to create the illusion of three-dimensional space. Defining the eye as a “point” was an erroneous assumption, but it provided a necessary focus for the system of converging lines of the visual cone postulated in the construction.

To understand why the “science” of perspective was so important to Piero, why he spent the last years of his life studying problems of mathematics and geometry rather than practicing the art of painting, it is perhaps necessary to consider the philosophical attitude of his time toward those activities. In our age, art and science have come to be separated by a hostile and seemingly unbridgeable gulf, a gulf which did not exist in the mind of the Quattrocento.³⁸ I think it is not far wrong to say that for men like Piero, Alberti, and Leonardo, “science” was principally the discovery of the divine order which they firmly believed informed the universe. Mathematics was a language for expressing that order, and art was a man-made creation whose purpose it was to reflect that divine order. As activities or processes, science and art were largely indistinguishable, for both built, upon a foundation of faith, structures that were held together by logic and reason.

Piero’s *De Prospectiva* deals with only one element of painting, his art is a thorough integration of the three elements of painting. Piero used perspective, like the simplified geometry of his forms and the musical harmonies of his colors, to create images of that lucid order “of which God, the greatest architect, is the master and author.”³⁹

* * *

And thus I alleviated the fatigue of writing, by the thirst and pleasure of gaining information. — *L. B. Alberti*

Note: This paper was written for a graduate course in Italian Renaissance Painting with [Professor Howard Davis](#) at Hunter College in the late 1960s. Rather than simply photocopying it, I have transcribed the original typescript digitally, to render it readily searchable. Apart from correcting obvious typos or misspellings, and some alterations of punctuation and citation style, I have made no changes. Regrettably, I’ve lost the images that originally accompanied the paper. Wherever possible, however, I’ve linked to comparable images online. — *M.M.K.*

BIBLIOGRAPHY

- Apollonio, Umbro. Review of G. Nicco Fasola's critical edition of *De Prospectiva Pingendi, Emporium*, XCIX (1944), 113.
- Berenson, Bernard. "Piero della Francesca," *Art News Annual*, XXV (1956), 39.
- Bianconi, Piero. *All the Paintings of Piero della Francesca*. Translated by P. Colacicchi. New York, 1962.
- Biggiogero, Giuseppina Masotti. "On the Life and Works of Luca Pacioli," appendix to *De Divina Proportione* (Milan, 1956).
- Boime, Albert. "Seurat and Piero della Francesca," *Art Bulletin*, XLVII (1956), 265–71.
- Clark, Sir Kenneth. *Piero della Francesca*. London, 1951.
- Feudale, C. "Iconography of the Madonna del Parto," *Marsyas*, Vol. VII, pp. 8–24.
- Francesca, Piero della Pietro di Benedetto dei Franceschi. *De Prospectiva Pingendi*, ed. by G. Nicco Fasola. Florence, 1942.
- Gilbert, C. "On Subject and Not-Subject in Italian Renaissance Pictures," *Art Bulletin*, XXXIV (1952), 208–11. Reply with rejoinder, *ibid.*, XXXV (1953), 85–6.
- Gombrich, E.H. "Repentance of Judas in Piero della Francesca's 'Flagellation of Christ,'" *Journal of the Warburg and Courtauld Institutes*, XXII (1959), 172.
- Guston, P. "Piero della Francesca: The Impossibility of Painting," *Art News*, LXIV (1965), 38–39.
- Holt, Elizabeth G. (ed.). *A Documentary History of Art, Volume I: The Middle Ages and the Renaissance*. New York, 1957.
- Ivins, W.M., Jr. "Albertian Scheme: Rational Method of Perspective Representation," *Metropolitan Museum Bulletin*, XXXI (1936), 278–80.
- . *On the Rationalization of Sight, with an Examination of Three Renaissance Texts on Perspective*. Metropolitan Museum Studies, 1938.
- Meiss, Millard. "'Highlands' in the Lowlands: Jan van Eyck, Master of Flemalle and the Franco-Italian Tradition," *Gazette des Beaux Arts*, series 6, Vol. LVII (1961), 305.
- . "Ovum struthionis: Symbol and Allusion in Piero della Francesca's Montefeltro Altarpiece." In *Studies in Art and Literature for Belle da Costa*, ed. by Dorothy Miner. Princeton, N. J., 1954.
- Paccioli, Luca da Borgo. *De Divina Proportione*. Milan, 1956.
- Panofsky, Erwin. *Early Netherlandish Painting: Its Origins and Character* (Cambridge, Mass.: 1964), pp. 1–14.
- "Piero della Francesca, or the Ineloquent in Art, by B. Berenson" review, *Connoisseur*

- (American Edition), CXXXIV (1954), 292.
- Sands, N. E. "Restoration Error: The Annunciation from the Fresco at Arezzo," *Apollo*, LXIII (1956), 62.
- Spencer, J. R. "Spatial Imagery of the Annunciation in Fifteenth-Century Florence," *Art Bulletin*, XXXVII (1955), 273–80.
- Stokes, Adrian Durham. *Art and Science: A Study of Alberti, Piero della Francesca, and Giorgione*, London, 1949.
- Tolnay, Charles de. "La Resurrection du Christ par Piero della Francesca: Essai d'Interpretation," *Gazette des Beaux Arts*, series 6, Vol. XLIII (1944), pp. 35–40 (English translation, pp. 62–63).
- Vasari, Giorgio. *Lives of the Most Eminent Painters, Sculptors, and Architects*. Abridged from the translation by Gaston DuC. De Vere. Edited, with an Introduction, by Robert N. Linscott. New York, Modern Library, 1959.
- Venturi, Lionello. *History of Art Criticism*. Translated by Charles Marriott. New York, 1964. (Dutton paperback edition.)
- Wittkower, Rudolf. *Architectural Principles in the Age of Humanism*. New York, Random House, 1965.
- . "Brunelleschi and Proportion in Perspective," *Journal of the Warburg and Courtauld Institutes*, XVI (1953), 281–85.
- , and B.A.R. Carter. "The Perspective of Piero della Francesca's 'Flagellation,'" *Journal of the Warburg and Courtauld Institutes*, XVI (1953), 292–302.

NOTES

- [1.](#) In Holt, p. 218.
- [2.](#) Vasari (Modern Library Edition,), pp. 99, 102.
- [3.](#) Pacioli's statement is referred to by G.M Biggiogero in her appendix to the *De Divina Proportione*, as well as by many other writers.
- [4.](#) Wittkower, "Brunelleschi and Proportion in Perspective," p. 285.
- [5.](#) Clark, p. 53.
- [6.](#) Stokes, pp. 11, 34.

7. The statements which follow are based on a careful reading of the translated portions of the *De Prospectiva* in Holt and on a skimming of the Italian text of the treatise. I operated on the assumption—not ill-founded, I hope—that Mrs. Holt would have selected the most important parts of the treatise for translation.

8. In Holt, p. 266.

9. Nicco Fasola, Introduction to *De Prospectiva*, pp. 50–55.

10. Spencer, p. 274.

11. Clark, p. 30.

12. Nicco Fasola, p. 52 (translation mine) .

13. Tolnay, pp. 62–63.

14. Clark, p. 40.

15. The reproduction of the *Resurrection* in the Tolnay article shows the columns well.

16. Clark, p. 38; also Meiss, “‘Highlands’ in the Lowlands,” p. 305.

17. Clark, pp. 38-39.

18. This symbolic interpretation of the “plateau” type of composition is given by Meiss in “‘Highlands’ in the Lowlands,” p. 306. According to him, the Italian Quattrocento artists were the first to employ the motif for secular subjects.

19. Clark, p. 20.

20. Gilbert, p. 209.

21. *Ibid.*, p. 208.

22. *Idem.*

[23](#). One obvious objection to this conclusion is that though the business of “onlookers” normally is to “look on”, the bystanders in Piero’s *Flagellation* are turned away from the scene. I think Pierre Guston’s (*op.cit.*, p. 39) description of the painting more closely captures its spirit: “The architectural box is opened by the large block of discoursers to the right, as if a door were slide aside to reveal its contents. The flagellation of Christ . . . is placed in the rear, as if in memory.”

Another objection is that even if Gilbert’s assumption, that the three foreground figures are not portraits, is correct, the conclusion does not necessarily follow that the figures have no particular significance. They may still be symbolic figures of some sort.

[24](#). Gilbert, p. 209.

[25](#). Clark, p.49

[26](#). An ellipsoid, which can be derived from a conic section, is similar in form to an egg but it has three planes of symmetry, unlike an egg, which has only two:

[27](#). In “*Ovum Struthionis: Symbol and Allusion in Piero della Francesca’s Montefeltro Altarpiece.*”

[28](#). In “The Perspective of Piero della Francesca’s ‘Flagellation.’”

[29](#). Sir Kenneth Clark (*op. Cit.*, p. 20) discusses the mathematical ratios of the surface design of the picture.

[30](#). Wittkower and Carter, p. 293.

[31](#). *Ibid.*, *passim*.

[32](#). *Ibid.*, pp. 294 ff.

[33](#). *Ibid.*, p. 302.

[34](#). Appollonio, p. 113.

[35](#). After I had written this statement, I read the following in Panofsky’s Introduction to *Early Netherlandish Painting* (pp. 3–4):

As coined by Boethius and used by all writers prior to the fifteenth century the

word *perspectiva* refers to *perspicere* in the sense of “seeing clearly,” and not in the sense of “seeing through”; . . . it designates a mathematical theory of vision and not a mathematical method of graphic representation. Dürer’s definition of perspective as a “seeing through” on the other hand, gives an excellent and brief description of “perspective” as understood in postmedieval usage. . . . Exact mathematical perspective as developed in the fifteenth century is nothing but a method of making . . . Alberti’s “view through a window” constructible.

Panofsky’s etymology shows better than I could have hoped to do the aesthetic emphasis of Renaissance perspective.

[36](#). In Holt, p. 258. The first sentence of this statement was the fundamental theorem of Euclid’s *Optics*, which Brunelleschi, Alberti, and Piero used as the starting point for their analyses of perspective construction. It goes without saying that Euclid is not remembered in our day for his work on optics.

[37](#). The situation in the eye is complicated by the operation of the lens, which focuses and inverts the image. If the lens were a simpler structure, similar to the pinhole opening in a *camera obscura*, Piero’s assumption that the power of vision is a point would be nearly correct in part, though he would still have ignored the existence of a “projection plane” in the retina.

[38](#). In the words of Professor Wittkower (*Architectural Principles*, p.7, 8): “For Alberti—as for other Renaissance artists—this man-created harmony [the harmonic perfection of a geometrical scheme] was a visible echo of a celestial and universally valid harmony.”

[39](#). This quotation is not from Piero or his contemporaries but from a memorandum by the architect Francesco Giorgi (Appendix I in Wittkower, *Architectural Principles*), who was active about a half-century later than Piero. In view of Professor Wittkower’s statement quoted in the preceding note, however, it seems valid to use Giorgi’s phrase with reference to the Quattrocento and Piero.