In his notes which follow each chapter, Maurin gives explanations to the text, and has succeeded in giving a rather well balanced account of the successes and failures in Hobbes' book. It is a pleasure to see in how careful and detailed a manner Maurin has commented on Hobbes' text.

In the preface Ronchi has followed the development of optics from antiquity to the time of Hobbes. Especially Kepler's contribution to optics is considered, and Ronchi tries to understand how, in the *De Homine*, Hobbes locates an object by referring back to Kepler's *Paralipomena ad Vitellionum* and *Dioptrica*. This is a very interesting interpretation. However, neither Ronchi in his preface nor Maurin in his notes has considered *De Homine* in the context of Hobbes' other writings. It would have been interesting and desirable to see how *De Homine* fits into the internal development of Hobbes' ideas of optics. At least a bibliography of relevant secondary literature should have been offered the reader as a guide to further studies.

In summary we have here a readable book, a good translation, a valuable introduction and notes. Yet a critical edition and a scholarly analysis of the role played by *De Homine* in the optical revolution of the 17th century is still wanted.

THE RENAISSANCE REDISCOVERY OF LINEAR PERSPECTIVE. By Samuel Y. Edgerton, Jr. New York (Basic Books, Inc.). 1975. xvii + 206 pp. $16.50.

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The major facts of the history of linear perspective are reasonably well known and are not changed by this book. That which is new, interesting, and significant in it is conjectural, but well supported by literary and experimental evidence as well as by arguments.

The author is an art historian. A person seeking data solely on mathematics and its history, per se, will find little in this book, but one who also seeks the motivation for and immediate causes of new developments, as well as the connections between mathematics and such aspects of our culture as art, commerce, science, philosophy, and religion will find it interesting.

The facts of the history of perspective are listed in a brief, introductory, chronological outline. They include: the early Greek interest in "optics" (direct vision or "perspective," reflection, refraction) as in Euclid's presentation of a sequence of theorems and proofs; the use of perspective in the Greek theatre and Roman architecture; Arabic writings on optics followed by such European expositors as Roger Bacon and John

Pecham; and the final development of *linear* perspective in the fifteenth century by Brunelleschi, who discovered some major techniques, and his friend L. B. Alberti, who first wrote of them. This chronological outline partially frees the later narrative from chronological restraints.

In the first two chapters ("Western Window" and "Pictures in the Service of God"), the author compares the "*discovery*" (not *invention*) of perspective with the contemporary discoveries of Columbus and Copernicus, all of which he views as victories over medieval parochialism.

Although there had been some earlier use of central composition and reverse perspective, the author contends that it was Brunelleschi's discovery while in fifteenth century Florence, of the vanishing point that triggered the "Re-discovery" which is his main theme. Hence, chapters III and IV review "Alberti's Florence" and "Alberti's *Compositione*." Edgerton explains that in bustling Florence "Mathematics was becoming a kind of social lingua franca, linking upper and lower classes, creating a bond among humanist intellectuals, bankers, artisans, and shopkeepers. (p. 36)." The author conjectures that Paolo dal Pozzo Toscanelli, a friend of both Brunelleschi and Alberti, may have mathematically helped the former to develop the geometric approach expounded by the latter.

The development of optics through the time of Alberti is traced in Chapters V and VI. The author stresses a difference between the Euclidean viewpoint and that of Alberti by noting that the latter refers to a point as a "mark" (*signum*), and that otherwise his definitions are concrete and more appealing to painters than to mathematicians--as when he discusses a plane as a tangible thing with a boundary. To the reviewer this is reminiscent of Desargues' invention of a new vocabulary of "trees" and "buds" when he wrote on perspective for architects and artisans a century later. It also suggests a distant approach to the concept of model building in the application of mathematics today.

Chapters VII and VIII develop a second explanation for the "rediscovery" of linear perspective at this time, the introduction into Florence of Ptolemy's *Geographia*. This was brought back by Chrysoloras and Jacopo d'Angiola in 1400. It was then a book of great popular interest. It not only served to accentuate a "grid mentality" (p. 114) which already existed, but, in Chapters 6 and 7 of Book VII, it expounded a method of map making which is conceptually very close to the eyepoint-object-visual cone-picture plane concept of linear perspective. Edgerton bases his discussion of these two rather obscure and vague chapters on an article by Otto Neugebauer in *Isis*, volume 50 (1959) in which it was also pointed out that Ptolemy had used double orthogonal projection in other works, especially in his *Analemma*.

In Chapters IX and X Edgerton describes his own effort to reconstruct from literary sources an experiment which Brunelleschi conducted using a mirror and a painting of the Baptistry in Florence. Edgerton also used a camera to record the mirrored image and the painting which he believes Brunelleschi persuaded friends and bystanders to observe alternately. Edgerton believes that in this manner Brunelleschi demonstrated the convergence of parallels to a central vanishing point on a picture as a fact of vision which could be the basis of a geometric process for perspective drawing. Brunelleschi may also have, himself, discovered the vanishing point in this way, but Edgerton does not strongly suggest this, and the reviewer questions it.

In his final Chapter Edgerton discusses Panofsky's view of Cassirer's "symbolic form" under which linear perspective was the symbolic form of the Renaissance. The author accepts this with some modifications, saying, "Within the Renaissance paradigm ... linear perspective served as the most appropriate convention for the pictorial representation of 'truth.'" He concludes that linear perspective contributed more to the advancement of science than to the history of art. (pp. 161-164)

As suggested in the first paragraphs, the major contributions of this book to the history of mathematics are its suggestions that Brunelleschi, who left no writings, developed, or at least supported, the vanishing point idea experimentally, and that the fifteenth century Florentine interest in cartography may also have played a role in the development of linear perspective. Neither the author nor most historians of perspective note yet another fact which partially supports the importance of cartography. In 1558 Commandinus published in Venice a commentary on Ptolemy's *Planispherium*. The title page bears the legend "In quo Scenographicis ratio quam brevissime traditur, ac demonstrationibus confirmatur." Pages 2-19 of the commentary are actually Commandinus' clear, geometric explanation of the construction of the linear perspectives of points using double orthogonal projection. Of course Commandinus (1509-1575) may well have been familiar with some version of Alberti's *Della Pittura*, which, although completed in 1435, did not appear in print in Venice until 1547. But whatever the sequence and whoever the persons, this commentary demonstrates that the connection between linear perspective and cartography was perceived clearly in the early sixteenth century and probably in the fifteeth.