
The Mirror, the Window, and the Telescope: How Renaissance Linear Perspective Changed Our Vision of the Universe by Samuel Y. Edgerton

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In this book, Samuel Edgerton Jr aligns three objects—the mirror, window, and telescope—with three stages in the history of perspective, each having distinct implications for ways of seeing the natural world. The stakes are high. Like Panofsky, Gombrich, and others, Edgerton is convinced that perspective is bound up with the origins of modernity and modern science. His argument centers on a careful reconstruction of the use of linear perspective by the Florentine architect Filippo Brunelleschi and the polymath Leon Battista Alberti. He closes with an argument for Galileo’s dependence on the perspectival tradition.

This version of Edgerton’s story builds on a career in the history of art and optics. Three and a half decades ago, Edgerton began his *Renaissance Rediscovery of Linear Perspective* [1975] with a chapter titled ‘The Western Window’. There, he identified Brunelleschi’s lost 1425 painting of the Florence Baptistery as the first example of true linear perspective, raising the inevitable question of why linear perspective painting should have arisen in 15th-century Florence. For an answer, Edgerton pointed to late medieval Franciscan spiritual art and architecture in Florence, which seemed to provide artisanal parallels to how medieval philosophers such as Roger Bacon and Thomas Bradwardine valued optics for its theological insight. At about the same time (around 1400), Ptolemy’s *Geographia* was rediscovered in the West, which provided three different examples of geometrical projection for mapping, mathematical techniques similar to that used in linear perspective. Optical imagery was ‘in the air’. In laying out the strands of this cumulative argument, Edgerton

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meticulously reconstructed the mechanics of linear perspective from Alberti's descriptions, explaining the three technical requirements of linear perspective: vanishing point, distance point, and horizon line isocephaly (whereby the horizon line is presented at the same level as the viewer's eyes). This accumulation of events, texts, techniques, and people, argues Edgerton, is evidence for a strong connection between perspective and the rise of modern science. Perspective entailed an 'objective' way of seeing, on this argument, because it created the expectation that a picture be like a window faithfully presenting the reality beyond.

Edgerton was fully aware that such a claim for Florentine exceptionalism entailed a bolder claim for Western exceptionalism. In 1991, he published *The Heritage of Giotto's Geometry: Art and Science on the Eve of the Scientific Revolution*. This volume mixed, *inter alia*, Joseph Needham's analysis of European scientific singularity with Edgerton's own elegant analysis of the art and geometry of artisanal practice. For example, a chapter on the 'Geometrization of the Supernatural' detailed the apparently pervasive medieval desire to 'see' how God sees geometrically—a desire which some Franciscans, Brunelleschi, and Alberti thought could be actualized by means of perspective. Here Edgerton expanded on comments he had made earlier about a 'centralizing tendency' which can be seen—for one instance—on the walls of the Basilica of San Francesco, Assisi. There angles of painted modillions and dentils converge to a vertical axis, hinting at the vanishing point in linear perspective. After a suggestive argument about Galileo's indebtedness to the perspectival tradition in recognizing the three dimensions of Moon 'spots', Edgerton compared Western and Chinese knowledge of perspective. Jesuits took the geometry of perspective eastward with them, and it seems that Chinese manuals only begin employing perspectival images after that point.

In *The Mirror, the Window, and the Telescope*, Edgerton both recapitulates and adds to the argument developed in his previous books. Again, he starts with how Western Renaissance art begins to look very different from medieval art. His 15 short, crisp chapters can be roughly divided into four groups organized around three figures significant to historians of science and art. In the first group [chs 1–5], Edgerton sets Florentine thinking about geometry and optics against the background of late medieval religious values. Considering

‘T-O *mappae mundi*’ (shaped like a ‘T’ within an ‘O’), he suggests that their centering on Jerusalem stimulated Roger Bacon and others worried about Christendom’s global fortunes to think hard about the technological benefits promised by optics, such as burning mirrors. In parallel, the Franciscan mandate to preach and convert was focused on attempts at realistic representation of devotional scenes. Such visual preaching matched an understanding of optics as insight into God’s own way of seeing, as Robert Grosseteste and Meister Eckhart held. Having painted these various levels of optical meaning, Edgerton considers Fra Antonino, the Archbishop of Florence. His *Summa theologia*, Edgerton tells us, was a condensation of ideas that he had already aired to the Florentine public in popular sermons. So when Archbishop Antonino describes intellectual power in the technical terms of optics, Edgerton wants the reader to consider the impact:

What effect might Antonino’s preaching have had on fifteenth-century Florentines, especially artists, who were also beginning to think of their pictures as mirrors reflecting the grandeur of God’s Creation? [36]

Having compared Edgerton’s hypothesis of what was in Antonino’s sermons to my own reading of Antonino’s *Summa*, I remain unconvinced that the sources support such a strong causal inference. But, causal arrow aside, Edgerton’s worrying of the Florentine context is evocative. By closing the fifth chapter of the book with the supported claim that optics and mirrors employed by artisans like Brunelleschi were invested with intertwined spiritual, intellectual, and practical meanings, Edgerton avoids reductive dichotomies of theory and practice.

The second group of chapters [chs 6–9] is dedicated to a vindication of Edgerton’s earlier reconstruction of how Brunelleschi first painted the Baptistery of Florence, as recounted by Alberti. Using computer modeling and his own photographs of the Baptistery, Edgerton argues (against other reconstructions, such as that by Richard Krautheimer and David Summers) that Brunelleschi must have drawn the first image by transferring it from a mirror, with his back to the Baptistery. Contemporary evidence from artisan Antonio Manetti (Filarete) indicates that other artisans were aware of the foreshortening effects of mirror images. Manetti’s description of

Brunelleschi's work explicitly mentions Brunelleschi's use of a mirror [69 (quotation)]. The pictorial illusion of perspective, for Edgerton's Brunelleschi, is seeing in a mirror—it is seeing truly. Chapters 10 and 11 connect Edgerton's account of early 15th-century perspective to Florentine religious paintings, suggesting that by flouting rules of perspective (or mirroring), artists were making statements about how sacred subjects might, or might not, be seen with fleshly eyes [cf. 116].

Edgerton devotes a third group of chapters to Leon Battista Alberti's rules for constructing perspective pictures. Though the account is more nuanced than I represent here, this section is driven by how Alberti employed the metaphor of a latticed 'window' to direct the creation of a perspective painting. This construct, Edgerton argues, encouraged thinking about the painter as replicating events, objects, and people on a realistic background. Rather than simply mirroring reality, a perspective painting faithfully organizes nature. Edgerton pursues this epistemic implication of Alberti's method through the religious art of Raphael and Titian, suggesting that such geometrical organization was too concrete to convey abstract dogmas without becoming absurd. Windows are open to nature but do not peer into heaven.

The last chapter stands as its own group, connecting the optics of perspective to Galileo's telescope or 'perspective tube'. In 1609, Thomas Harriot also used a telescope to observe and even draw the Moon. Galileo alone, however, noticed that the Moon's 'spottedness' was due to three-dimensional mountains and valleys on the lunar surface. Edgerton argues that this insight, and the paintings that Galileo made from his observations, are as artistic as they are scientific. As the postscript makes clear, Edgerton sees the language of art and the language of science merging in perspective, encompassing both disciplinary domains, much as do modern computer-generated images of distant galaxies.

This is a telling note on which to end the book. Not only does art appropriate the methods of optics to become more objective but the representations of science are also art. I doubt that Edgerton makes this point to introduce subjectivity into his definition of science. As he says in the preface, Edgerton sees himself as an apologist for linear perspective in art history which 'no longer considers it [perspective] a positive idea' but instead sees it as 'merely a brief

sidetrack in the evolution of world art' [xiv]. Of course, being aimed at 'the general reader' [xv], the book cannot address every minor controversy. But not all controversies are minor. Some readers may be uncomfortable with the implicit dichotomy between 'the persistence of religious belief' and the subjective representation of dogma in medieval non-perspectival art [144–147], on the one side; and, on the other side, secularized perspective, objectivity, and science [see especially preface and epilogue].

Moreover, the correlation of three ways of seeing or knowing with three objects is a conceit bearing an air of inevitable scientific progress through objectivity. Edgerton, after quoting from Galileo's description of the Moon in the *Sidereus nuncius*, exclaims:

Did ever a Baroque painter express the new secular spirit of landscape art better than this? . . . Moreover, after thus having marveled at the picturesque lunar terrain, Galileo quickly reverted to his scientific self . . . [163]

Subjective artistic experience is something separable from the secularizing objectivity of the scientific self, apparently. Those lacking confidence in this dichotomy might have wanted, for example, Edgerton to provide some critical interaction with James Elkins' *Poetics of Perspective* [1995], which influentially explored how the notion and practice of 'perspective' developed into a metaphor for subjectivity during the same period covered by *The Mirror, the Window, and the Telescope*. (Elkins is listed in Edgerton's bibliography, and thanked in the preface.) But the only difference Edgerton notes between them is that Elkins believes Brunelleschi's insight to be less sudden than does Edgerton—which seems to miss the deeper point of disagreement [90]. Neither does Edgerton address Stuart Clark's massively documented *Vanities of the Eye* [2007], which powerfully shows how dubious was the epistemic status in which early moderns held vision, mirrors, and other phenomena related to optics. By skirting such debates, Edgerton seems to repeat older definitions of art and science, not to provide new arguments.

Despite these caveats, the appeal of Edgerton's book lies first in the elegance, refined over many years, with which he presents the basics of Renaissance linear perspective. That elegance is found in the same simplicity that I have questioned. And that simplicity will make this an excellent undergraduate text. Historians of science who have

read Edgerton's other work may not find a new interpretation of the history of optics and perspective—but they will find fresh insight into the concrete interactions that Edgerton finds between the mechanics of perspective and Renaissance art in several Florentine contexts.

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