THE VIRTUAL WINDOW

FROM ALBERTI TO MICROSOFT

ANNE FRIEDBERG

THE MIT PRESS CAMBRIDGE, MASSACHUSETTS LONDON, ENGLAND

First MIT Press paperback edition, 2009

MIT Press books may be purchased at special quantity discounts for business or sales promotional use. For information, please email special_sales@mitpress.mit.edu or write to Special Sales Department, The MIT Press, 55 Hayward Street, Cambridge, MA 02142.

This book was set in Adobe Caslon and HTF Gotham by Graphic Composition, Inc.

Printed and bound in Spain.

Library of Congress Cataloging-in-Publication Data

Friedberg, Anne.
The virtual window : from Alberti to Microsoft / Anne Friedberg.
p. cm.
Includes index.
ISBN-13: 978-0-262-06252-7 (hc : alk. paper)—978-0-262-51250-3 (pb : alk. paper)
1. Image (Philosophy)—History. 2. Mass media—Philosophy—History. I. Title.

B105.I47F75 2006
701—dc22

2006044876

10 9 8 7 6 5 4 3

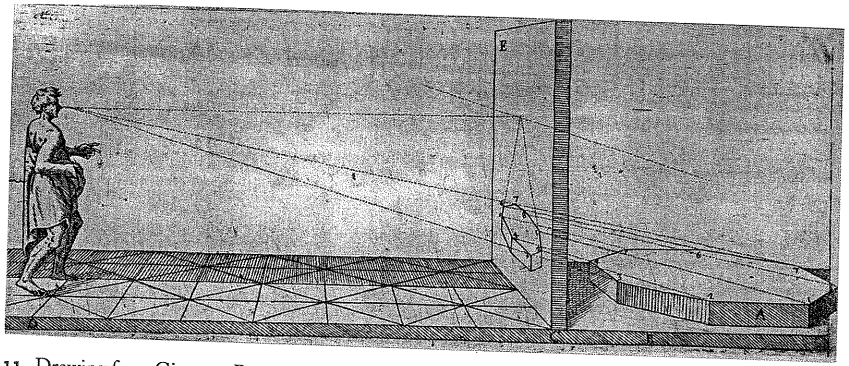
FOR
HOWARD
AND
TRISTAN

To live in a glass house is a revolutionary virtue par excellence.

—Walter Benjamin

1

THE WINDOW



1.1 Drawing from Giacomo Barozzi da Vignola, *Le due regole della prospettiva practica* (Rome, 1583).

1 PERSPECTIVE AND ITS FRAME

Alberti's 1435 metaphor for the painting (*pictura*) as an "open window" (*aperta finestra*) remains a pivotal trope in debates about the origins, practices, and traditions of perspective, debates that continue to pose key questions about visual representation itself. Is perspective a practical formula (as Martin Kemp, Samuel Edgerton, and Cecil Grayson describe)? An epistemological metaphor (as James Elkins eloquently denotes)? A transhistorical "symbolic form" (as Erwin Panofsky contends)? A visual system unique to Italy and distinct from the more aggregate system of visual representation relied upon by northern Dutch painters (as Svetlana Alpers argues)? The dominant visual system in Western culture, or one of several (as suggested by Martin Jay)? A technique for painters (*perspectiva artificialis*), as evidenced in the writings of Alberti, or for architects (*costruzione legittima*), as evidenced in the experiments of Brunelleschi (described in the work of Hubert Damisch, Alberto Pérez-Gómez, and Louise Pelletier)?[1] James Elkins depicts the conceptual and historiographical impasse between the many positivist accounts of perspective that revel in practice and not philosophy (i.e., resist metaphor) and the philosophical accounts that situate perspective within a history of Western thought (i.e., revel in metaphor).[2] The window serves as a symptomatic trope in these debates, because it has functioned both as a practical device (a material opening in the wall) and an epistemological metaphor (a figure for the framed view of the viewing subject).

In *De pictura,* Alberti demonstrates his attraction to the illustrative powers of metaphor to enrich his abstract reduction of the phenomenal world of vision to the mathematics of point, line, and surface.[3] He writes: "Mathematicians measure the shapes and forms of things in the mind alone and divorced entirely from matter. We, on the other hand, who wish to talk of things that are *visible,*

will express ourselves in cruder terms."[4] Alberti's "cruder terms" were supplied through language, not image; he supplied no diagrams for *De pictura.*[5] His geometrical account of vision was, instead, retold in a variety of translations—in the descriptors of the Latin language, in the vernacular Tuscan, in the language of metaphor.

Here it is instructive to compare Alberti's metaphor-laden *De pictura,* written early in his scholarly career (1435), with his lengthy disquisition on architecture, *De re aedificatoria* (On the Art of Building) written in 1452.[6] An examination of both texts will demonstrate several important differences between the fifteenth-century representational "picture" and the fifteenth-century architectural window. While *De pictura* has been the subject of extensive exegesis, I find it necessary to return to this text in order to ground a discussion of the window, perspective, and its frame. If read carefully, the famous passage that contains the window metaphor reveals some key assumptions about the "picture":

> Let me tell you what I do when I am painting. *First of all, on the surface on which I am going to paint, I draw a rectangle of whatever size I want, which I regard as an open window through which the subject to be painted is seen;* and I decide how large I wish the human figures in the painting to be. I divide the height of this man into three parts, which will be proportional to the measure commonly called a *braccia;* for, as may be seen from the relationship of his limbs, three *braccia* is just about the average height of a man's body. With this measure I divide the bottom line of my rectangle into as many parts as it will hold; and this bottom line of the rectangle is for me proportional to the next transverse equidistant quantity seen on the pavement. Then I establish a point in the rectangle wherever I wish; and as it occupies the place where the centric ray strikes, I shall call this the centric point. The suitable position of this centric point is no higher from the base line than the height of the man to be represented in the painting, for in this way both the viewers and the objects in the painting will seem to be on the same plane.[7]

In this paragraph Alberti outlines a formula for perspectival painting that entails (1) a variable rectangular frame, (2) the window as a metaphor for the frame of the painting, (3) the "subject" that is seen through this frame, (4) the human figure as a standard of measure and as determinant of the "centric point," and (5) the immobility of the viewer.

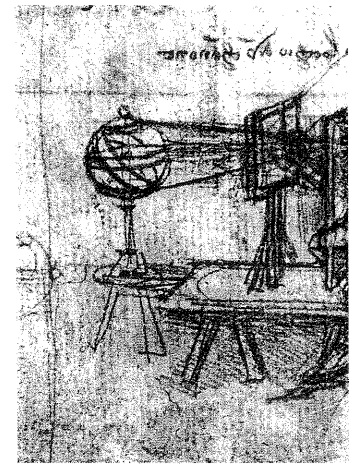
Alberti was a geometer of vision; he recast the visual coordinates of space into the geometrics of triangle, pyramid, and intersection. Relying on the Euclidean optical principles of the "visual pyramid" and "visual cone," Alberti described the operation of vision in terms of visual rays that stretch between the eye of the beholder and the object seen—a triangular pyramid formed by rays that converge from the eye as vertex.[8] While Alberti was quick to "set aside" ancient debates about the visual process—whether rays were emitted from the eyes or from the visual plane—he stalwartly described vision as emanating from a fixed monocular point.[9]

Alberti applied this "cold logic of optical geometry" to painterly representation.[10] The "picture" was a surface, a plane that intersected the visual pyramid of sight at its perpendicular axis. The picture plane was thus imagined as a flat vertical surface between the artist (and viewer) and the scene depicted. The planar surface of the painting formed a material support for the painting's virtual representation: "A painting is the intersection of a visual pyramid at a given distance, with a fixed centre and a defined position of light, represented by art with lines and colours on a given surface."[11]

Hence, the artist and the viewer of the painting were in a fixed position in relation to the picture plane—a position that implied the artist's and the viewer's upright posture facing a picture plane also in an upright position.[12] In a later chapter, I will compare this concept of the picture plane to the film and television screen and to the computer "window," which also imply an upright viewer facing a vertical planar surface, Benjamin's "dictatorial perpendicular."[13] Unlike perspectival space which extends beyond the surface, computer space flattens the spatial differences between near and far, supplying no perspectival depth.

The perspectival image constructed from this single viewpoint also needed to be viewed from a single point, encoding the position of its viewer into its representation. Perspectival representation was dependent on two important divergences from human vision. The mobility and binocularity of vision was reduced to a static, monocular "point" of view.[14] The vertex of single-point perspective took on the monocular view of the painter and positioned the viewer to share its vantage. Contemporary art theorist Norman Bryson deems the scene viewed by the painter as the "Founding Perception," a perception to be united with two other "points" of view: the point from which the painting is viewed (the "Viewpoint") and the imagined horizon where perspective rays converge (the "Vanishing Point").[15] The viewer apprehends from this vantage—as the monocular endpoint of converging visual rays.[16]

The "intersection" *(intersegazione)* of the converging rays of vision and the picture plane led Alberti to another related figurative construction for the planar surface. In a passage of *De pictura* that precedes his direct invocation of the window, Alberti describes the planar painting surface as "transparent and like glass": "They should understand that, when they draw lines around a surface, and fill the parts they have drawn with colours, their sole object is the representation on this surface of many different forms of surfaces, just as though this surface which they colour were so transparent and like glass [*admodum vitrea et perlucida huiusmodi*], that the visual pyramid passed right through it from a certain distance and with a certain position of the centric ray and of the light, established at appropriate points nearby in space. . . . Consequently the viewers of a painted surface appear to be looking at a particular intersection of the pyramid."[17]



1.2 Leonardo da Vinci drawing (1480–148
tival window," from Kim H. Veltman, *Li*
Visual Dimensions of Science and Art: Studi
vol. 1 (Munich: Deutscher Kunstverlag, 19

The surface of transparent glass serves as a vivid figure for the rays of vision passing—as if they were rays of light—through the picture plane toward a vanishing point. Many scholars have assumed that this passage invokes the trope of the window, even though Alberti refers to the transparency of the planar surface of the painting and not to the containment of its rectangular frame.

Here it is important to decouple the figure of transparent glass from the metaphor of the window and its frame of vision. Leonardo da Vinci later described techniques of perspective by imagining a "pane of glass, quite transparent, on the surface of which the objects behind that glass are drawn."[18] This oft-quoted passage led one scholar to conflate Alberti's window with da Vinci's prescription for a transparent glass surface and to deem this the "Leonardo window."[19]

One of Leonardo's drawings (from 1480–1482) shows a rather cumbersome perspective framing device that may be holding a transparent pane of glass. In a notebook of 1492, Leonardo drew an eye looking at an object through a transparent plane of glass (*pariete di vetro*) and provided this definition: "Perspective is nothing else than seeing a site behind a flat transparent plane, on the surface of which are marked all the things which are behind that glass and which can be conduced by mean of pyramids to the point of the eye and these pyramids intersect the said pane."[20] Leonardo emphasizes the transparency and flatness of

the plane as crucial components of the instrument but does not invoke the figure (or term) of the window or the importance of the frame.

The metaphor of the window may have functioned to situate the artist and the viewer in relation to the flat plane of representation, but—as I will further demonstrate in a moment—for Alberti, at least, the fifteenth-century window did not imply transparency. Given the architectural nature of fifteenth-century windows and the technical specifications of fifteenth-century glass, Alberti's mention of glass (*admodum vitrea*) in *De pictura* merely implied a surface that was transparent and not a window-view. This distinction will be important because it will challenge the assumption that Alberti's formula implied a subject matter for painterly representation. The painting was not intended to copy a literal view out the window but to recreate a spatial reconstruction of such a view. Hence, Alberti's window emphasized the rectangular frame of viewing, a frame for the spatial realism of perspective. The frame was what mattered, not the view from a window.

"First of all, on the surface on which I am going to paint, I draw a rectangle of whatever size I want." Alberti instructed the artist to begin with a rectangular frame that formed lines around the painting surface. As for the size and shape of the picture's frame, Alberti specified "a rectangle of whatever size I want." Hence, he had no exact codification for the size or proportion of the painterly frame, but, as we will see, its human subjects—both as viewer and as subjects in the painting—become proportional measures for its size.[21]

2. THE WINDOW AS METAPHOR

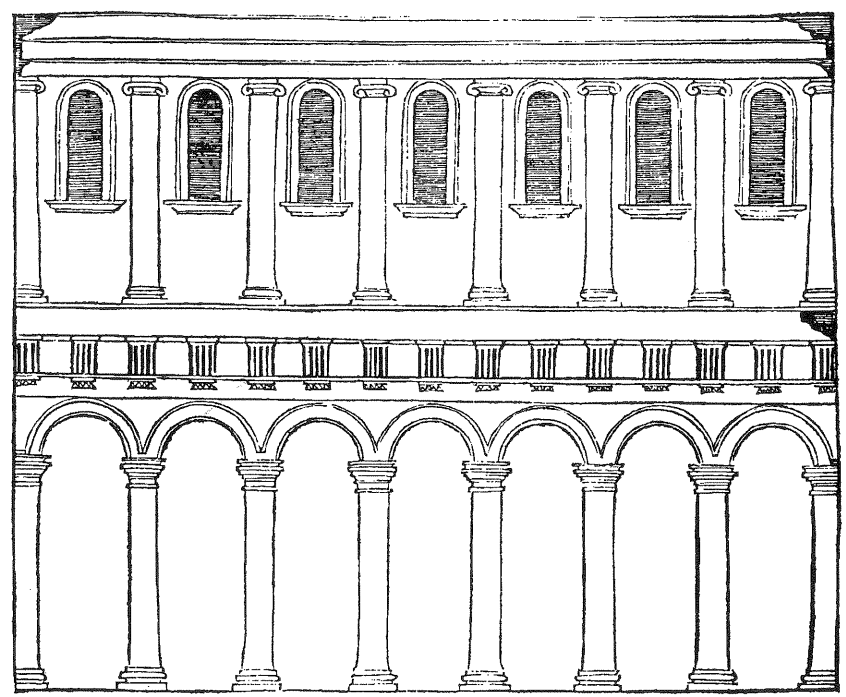
Alberti "regards" *(quod quidem)* this rectangle as an "open window" (*aperta finestra)*—not a glazed or closed one. In his later study of architecture, *On the Art of Building,* he describes the window as an opening (*apertio*) that functions for light and ventilation.[22] Alberti's window is an aperture, an opening distinguished from a door: "There are two types of opening, one for light and ventilation, and the other to allow man or object to enter or leave the building. Windows serve for light; for objects there are doors, stairs, and spaces between the columns. . . . Every part of the house should have a window to allow the air within to breathe and be regularly renewed, otherwise it will decay and become stale."[23]

Alberti's windows were either opened or shuttered or, if sealed by a protective pane, covered with a translucent stone like gypsum. Alberti describes the window of a temple:

> The windows that provide the temple with light would have, instead of leaves, *either fixed, thin slabs of translucent alabaster* or a lattice of bronze or marble, to keep out the frost and wind. In the latter case the spaces *were filled, not with fragile glass, but with transparent stone,* imported mainly from the Spanish town of Segovia, or from Boulogne in Gaul. These are *sheets of translucent and extremely pure gypsum* rarely larger than a foot in size and with the natural capacity not to deteriorate with age.[24]

And the window of a basilica:

> The openings of the windows should be latticed, but not glazed with gypsum, like those of a temple. Obviously they must contain something to ward off the bitter wind and keep out the irksome cold, to prevent any damage. On the other hand they must also provide continuous and unobstructed ventilation, to prevent the dust disturbed by the numerous feet from irritating eyes or lungs. I would therefore strongly *advise the use of thin sheets of bronze or lead, patterned with numerous tiny perforations, to admit light and breezes to purify the air.*[25]



1.3 Drawing from Leon Battista Alberti, *De re aedificatoria* (1452).

For Alberti, the architectural window was to serve for light and ventilation. Windows were *translucent,* not transparent.[26] This will be an important component of the window's eventual function—in relation to the mobility and virtuality of the images *seen through* "virtual" windows. I will discuss the history of glass and issues of transparency further but suffice it to say here that fifteenth-century windows did not necessarily use glass nor were they necessarily transparent.[27] Alberti's window was a metaphoric trope,[28] at odds with his own account of an architectural window. Whereas for Alberti the painting was like a window, paintings are less like the open window of *De pictura* and more like the translucent window of *De re aedificatoria.*

3. "THE SUBJECT TO BE PAINTED"

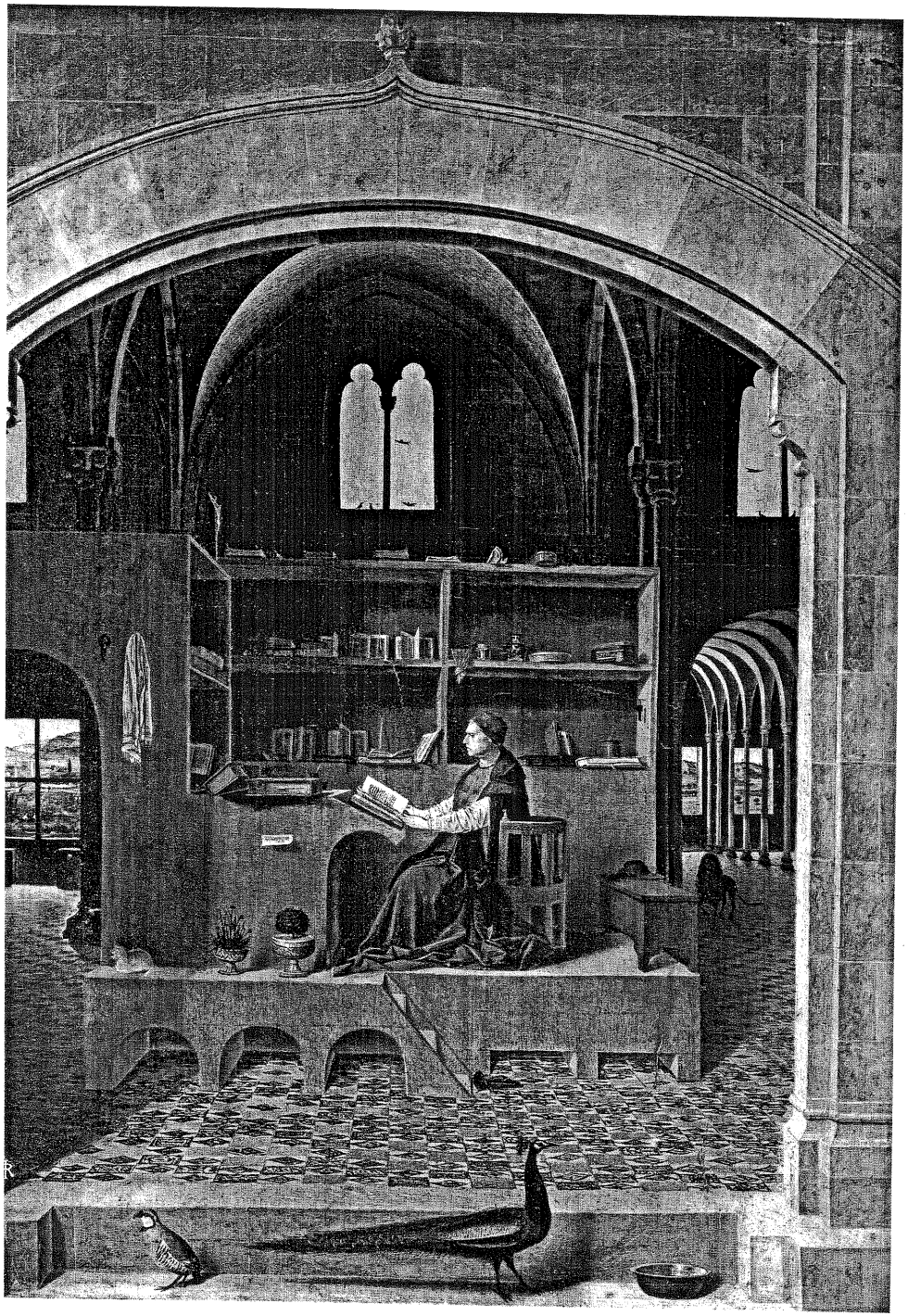
"The subject to be painted" was, in Alberti's Latin text, *historia.*[29] *Historiae* were imaginative narrative paintings of great events and classical heroes, and were not landscapes or direct records of nature.[30] The Latin text is important here because it indicates that what has been translated as "the subject to be painted" is, in Latin, *historia:* "quod quidem mihi pro aperta finestra est ex qua historia contueatur." Alberti's text has frequently been misunderstood on this point: he boldly meant it as a formula for representation of narrative *historia,* not of empty landscapes or window-views.[31] Hence the window was deployed as a figure for the frame and did not imply that the "subject to be painted" should be a mimetic rendition of what one would see out of an architectural window, looking onto the natural world. I will return to this point because, contrary to the common and flawed use of Alberti's window as a model for realist representation, Alberti supplies us with a Renaissance root for the concept of a windowed "elsewhere"—not a realism of subject matter but a separate spatial and temporal view.

In the introduction to a 1972 translation of *De pictura,* Cecil Grayson addresses the window's metaphoric function as descriptive of the picture surface: "Hence his [Alberti's] famous visualization of painting as a window through which the observer, from a certain fixed viewpoint on this side, looks at the scene 'outside.' The painter's object is to represent on the surface corresponding to that window (the picture surface) the three-dimensional space 'beyond,' which is continuous with that in which he himself stands. The window is the intersection of the visual pyramid. . . ."[32] To Grayson, the observer looks "outside" and "beyond" from a fixed viewpoint (these are Grayson's words, not Alberti's). Grayson corrects the common assumption that Alberti meant for the window to open onto an un-tampered view of nature: "Although Alberti recommends this sort of activity for training and for studying the outlines and proportions of Nature, he is not, generally speaking, advocating a kind of through-the-window representation as the subject of art. The artist's object is certainly to give the spectator the spatial experience of window-gazing, in which the mathematics of vision and the general appearances and proportions of Nature will dictate basic relationships and attitudes. It does not follow from this methodological realism that the spectator should see a scene of 'real life.'"[33] Grayson's introduction draws out this oft-neglected distinction—between the window-view as determinant of the realism of representation and the window-view as the determinant of the spatial experience of the spectator. The nuance of this distinction is apparent in Erwin Panofksy's opening paragraph of his 1924 essay "Perspective as Symbolic Form": "We shall speak of a fully 'perspectival' view of space not when mere isolated objects, such as houses or furniture, are represented in 'foreshortening,' but rather only when the entire picture has been transformed—to cite another Renaissance theoretician—into a 'window' and when we are meant to believe we are looking through this window into a space."[34] The spectator's experience of "gazing" through the window had its own spatial effect—and yet this new perspectival realism of representational space did not imply realism of subject matter, nor, as we will see in a moment, did it imply a temporal realism.

"Alberti's all-too-famous Renaissance idea of a painted image as window-like does not simply apply to the (overall) surface of a painting, assumedly framed," argues Joseph Masheck in his critique of the persistent art historical misreading of the Albertian window.[35] The assumption that the painting was a window through which the world is seen is, in Masheck's account, a troubling "misprision" that became a key tenet of antimodernist critics who charged modernist painting with the violation of this "Renaissance-validated pictorial sense."[36] What is important about the Albertian window, Masheck argues, is not its view onto a natural world, but its metaphoric index of the frame. I will return to Masheck's correction of the Albertian metaphor because I too wish to emphasize the importance of the frame of the window as the grounding metaphysic of its view.[37]

4. THE BODY AS MEASURE: THE HUMAN AS CENTRIC POINT

Alberti places the human figure in this frame as the key measure, a calculable element for correct proportion. The *braccia* of the human body serves as the standard of reference for the relative size of all objects in the frame that "stand to each other in a determined relationship."[38] In Alberti's schema, the human figure is three *braccia* tall, and human height establishes the centric point "no higher from the base line than the height of the man to be represented in the



Messina, *St. Jerome in His Study,* 1475, oil on canvas. National Gallery, London. Photo: Alinari/Art Resource, New York.

painting." The viewer is to be at the same height as the figure *in* the picture so that "both the viewers and the objects in the painting will seem to be on the same plane."[39] In this way, the body of the observer suggests a scale for the bodies in the representational confines of the painting. The human was in a central position as a spectator in front of a pictorial world but was also the measure of that world.[40] The painter's position was also to be the position of the viewer, framing and delimiting the image.

The mid-fifteenth-century painting *St. Jerome in His Study* provides an example of the idea of a picture as a view through a window: the painting is framed as if seen through an arched stone frame and ledge. Panofksy describes this painting as "an architectural exterior with the front removed"—a definitive "open" window.[41] Yet the painter, Antonella da Messina—almost as if to playfully taunt Alberti—places in the background of the painting a framed window with transparent glass, one that conforms to the mathematics of the perspectival vanishing point.[42] In the fifteenth-century study, the scholar does not look out of his window or into a screen, but holds a manuscript close for its illuminations.

In sum, Alberti's metaphoric "window" was a framing device for the geometrics of his perspective formula. While it implied a fixed position for the viewer of single point perspective, it did not assume or imply that the "subject to be painted" should be the exact view of what one would see out of an architectural window onto the natural world, as in a "window on the world." As a representational system, linear perspective was a technique for reproducing the space of what was seen on the *virtual* plane of representation. But if the logic of perspective produced a representation of pictorial space with the effect of window-gazing, it also placed new restrictions on a viewer who was, as one writer will describe, "immobilized by the logic of the system."[43]

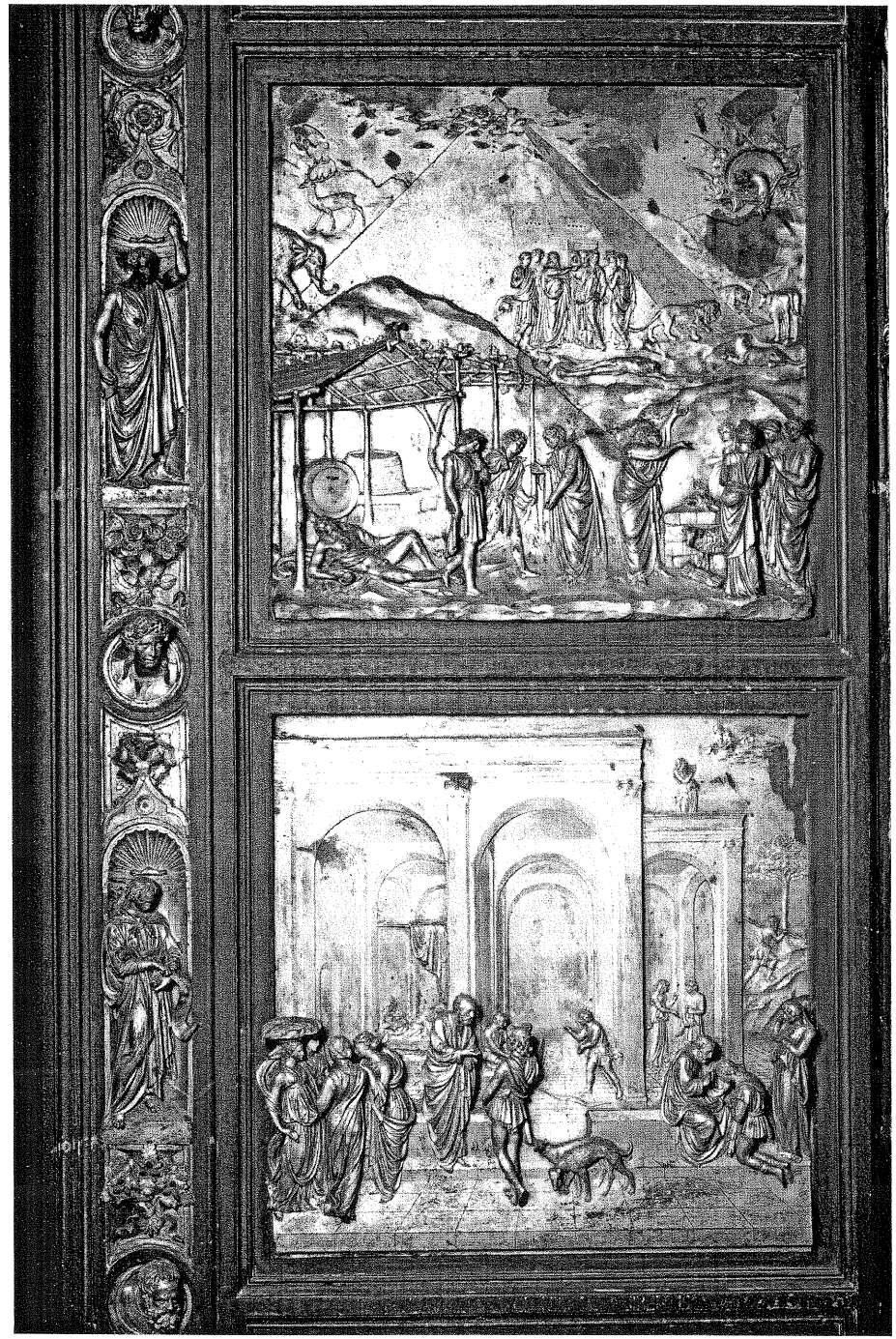
5. IMMOBILITY OF THE VIEWER

In his study *Story and Space in Renaissance Art: The Rebirth of Continuous Narrative* (2001), Lew Andrews challenges traditional accounts of the spatial innovations of Renaissance perspective, symptomatically summarized by German art historian Dagobert Frey's assertion that the "simultaneous unity of content of painting is scientifically attained in perspective."[44] In Frey's account in *Gotik und Renaissance,* the immobility of the Renaissance spectator is drawn in sharp contrast to the Gothic viewer. The Gothic painting, according to Frey, "scrolls off, as it were, like a film before the observer, except that the successive pictorial impressions do not depend upon the mechanical movement of the film, but upon the intellectual movement of the viewer."[45]

This passage from Frey's 1929 study deploys a striking metaphor for the viewer's relation to the multiple time frames implied by multiple scenes within the single frame of a Gothic painting: "like a film before the observer." Frey is comparing the pre-Renaissance viewer of a painting with the mid-twentieth-century cinematic spectator. In Frey's account, the Renaissance painting was thought to be rooted in a fixed moment of time, more like a photograph with its viewer fixed and its image motionless. The Renaissance viewer, Frey maintains, "must not stray from [the fixed position of the beholder] if the illusion of space is to remain convincing."[46] The assumption here about Renaissance painting and one-point perspective is that it was "mono-scenic," that it detailed a single image in a single frame, a unified pictorial space frozen in a single moment of time.

Yet Andrews notes a troubling paradox in the representational logic of single-point perspective: he finds a striking persistence of "polyscenic" frescoes, panels, and reliefs in the Renaissance. Ghiberti's Baptistry doors in Florence and Masaccio's *Tribute Money* (1427), Andrews suggests, provide telling examples of representations that conform to the new dictates of a spatial realism, but oddly, do not adhere to a temporal realism. They contain a repetition of figures seen in a variety of narrative moments—a "continuous narrative" in a single frame. This form of "polyscenic painting" is consistent with Alberti's window metaphor as I've just discussed it—as a mathematical formula for realist space, in no way precluding the *historia* of a continuous narrative.

Andrews challenges Frey and generations of art historians who describe the "polyscenic" paintings of the Renaissance as only a residual "mistake," a carry-over from earlier systems of representation. Instead, Andrews finds that "continuous narrative" or "polyscenic" painting—long considered an anachronism in the Renaissance—not only remains present after the introduction of linear perspective but becomes perhaps even more prominent. Read backward from a teleology that assumed Renaissance perspective found its ultimate end with the invention of the mechanical apparatus of the photographic camera, the multiple time frames of polyscenic "continuous narrative" painting may have seemed a mistake. What is significant here for my larger argument is that Renaissance painting, long thought to be the rational representation of a single moment in a single space—the proto-equivalent of a photograph—may not have had this "snapshot" quality, but instead contained a fracturing of times within a single space. This single insight challenges the common belief in a teleology leading from Renaissance perspective to the photographic camera, and will profoundly alter theories of the perspectival functioning of the cinematic image.



1.5 Detail of Lorenzo Ghiberti's *Gates of Paradise* (east doors), 1403–1424: story of Noah and Esau. Baptistry, Flore
Resource, New York.

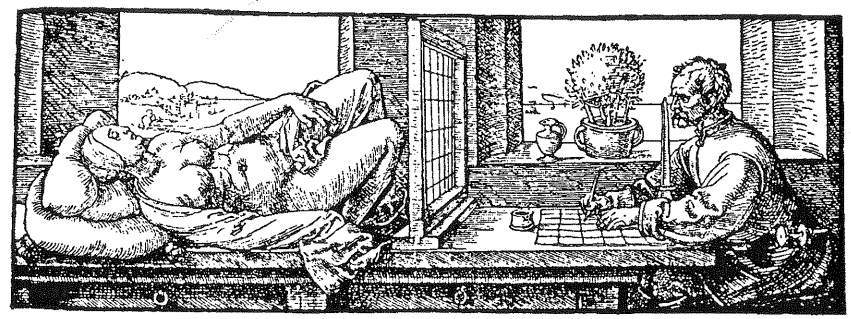
The histories of perspective practice and its theories—the treatises, manuals, and mechanical and illusionistic devices that proliferated after Alberti—complicate any assumption of a perseverance of a single representational technique.[47] And, as many commentators on Renaissance painting have detailed, the rules of perspective proffered by Alberti and other theoretical advocates were not necessarily followed by painters, and did not imply the fixed viewer often assumed. Michael Kubovy argues, for example, that the Renaissance painting may have been viewed from other positions than the apex of the visual pyramid.[48] As Leo Steinberg has masterfully demonstrated in his analysis of *The Last Supper,* Leonardo violated his own rules on the correspondence between the center of projection and the viewer's vantage.[49] And Svetlana Alpers has contrasted the framed picture surface of Italian painting with the surfaces of paintings by northern European artists (Vermeer, van Eyck, de Hooch), whose impulses, she claims, are more descriptive than narrative, less interested in the frame, more entranced with surfaces than depth.[50] The litany of questions that began this chapter remain testimony to the unease scholars have with reductive caricatures of the Renaissance representational system implied by perspective and its frame. Yet two points remain clear: (1) the frame of the window was an important metaphor for constructing the coherent spatial arrangement of objects on the picture surface, and (2) the single spatial frame of perspectival representation did not always imply a single frame of time.

THE WINDOW, THE *VELO*-GRID, THE FRAME

As we've just seen, in Alberti's geometric formula for creating the representational space of perspective, the window served as a metaphor for the rectangle of perspectival rendering, the frame of the picture plane. In *De pictura,* Alberti also described another framing device that, while not named as a window, functions in a similar way. The "veil" (*velo*) is "a grid-like netting stretched on a frame": "It is like this: a veil loosely woven of fine thread, dyed whatever colour you please, divided up by thicker threads into as many parallel square sections as you like, and stretched on a frame. I set this between the eye and the object to be represented, so that the visual pyramid passes through the loose weave of the veil."[51] But while Alberti suggested the rectangular frame and planar surface of a metaphoric "window" as a device for geometrical calculation, his *velo* did not require the calculation of orthogonals and vanishing points. It was, instead, dependent solely on its frame and its inset quadrants as a device to "map" the three-dimensional world onto a two-dimensional plane. "This veil affords the greatest assistance in executing your picture," Alberti instructed his readers, "since you can see any object that is round and in relief, represented on the flat surface of the veil."[52] With the *velo,* the artist divided the image into separate squares of a reticulated net. The grid of Alberti's *velo* forms a direct antecedent to the "bit-mapped" computer screen where picture elements—pixels—are "mapped" onto digital "bits."[53]

Leonardo described a similar perspective aid—with a plane of glass encased in the frame—which is illustrated with the drawing shown in figure 1.2. In a note from 1490, he explained: "the eye is to be placed at a distance from the glass of 2/3 *braccio* and the head is fixed by an instrument in such a way that the head may not be moved at all."[54] Leonardo's perspective frame used the transparency of glass as surface for the artist, an aid for reducing the proportions and forms of solid bodies to a planar surface. A variety of perspective "frames" are illustrated in the woodcut illustration in the first and second editions of Dürer's *Underweysung der Messung* (Treatise on Measurement) of 1525 and 1538. Unlike Alberti's unillustrated, pre-Gutenberg treatise, Dürer's woodcut illustrations of drawing devices illustrate the use of this *velo*-like frame for draftsmen. It was primarily through the reproductive technologies of print (in print, via print) that image-making devices like the perspective window were disseminated and held their power.[55]

As Dürer explained it: "*Perspectiva* is a Latin word which means 'seeing through.'" This is also the first sentence of Erwin Panofksy's seminal essay, "Die Perspektive als 'symbolische Form'": "Item Perspectiva ist ein lateinisch Wort, bedeutt ein Durchsehung."[56] The *velo*-frame did not rely on the geometric formulas for perspective delineated in Alberti's window metaphor, and yet it did posit a transparent plane for "seeing through." In one Dürer woodcut, the artist sits in front of a window-like grid through which he measures his subject. The latticework of the *velo*-frame aided the artist in translating the three-dimensional natural world onto the two-dimensional virtual plane of the picture surface. This well-known image—with the artist, male; the subject, voluptuous, reclining, and female—has often been used to indicate the



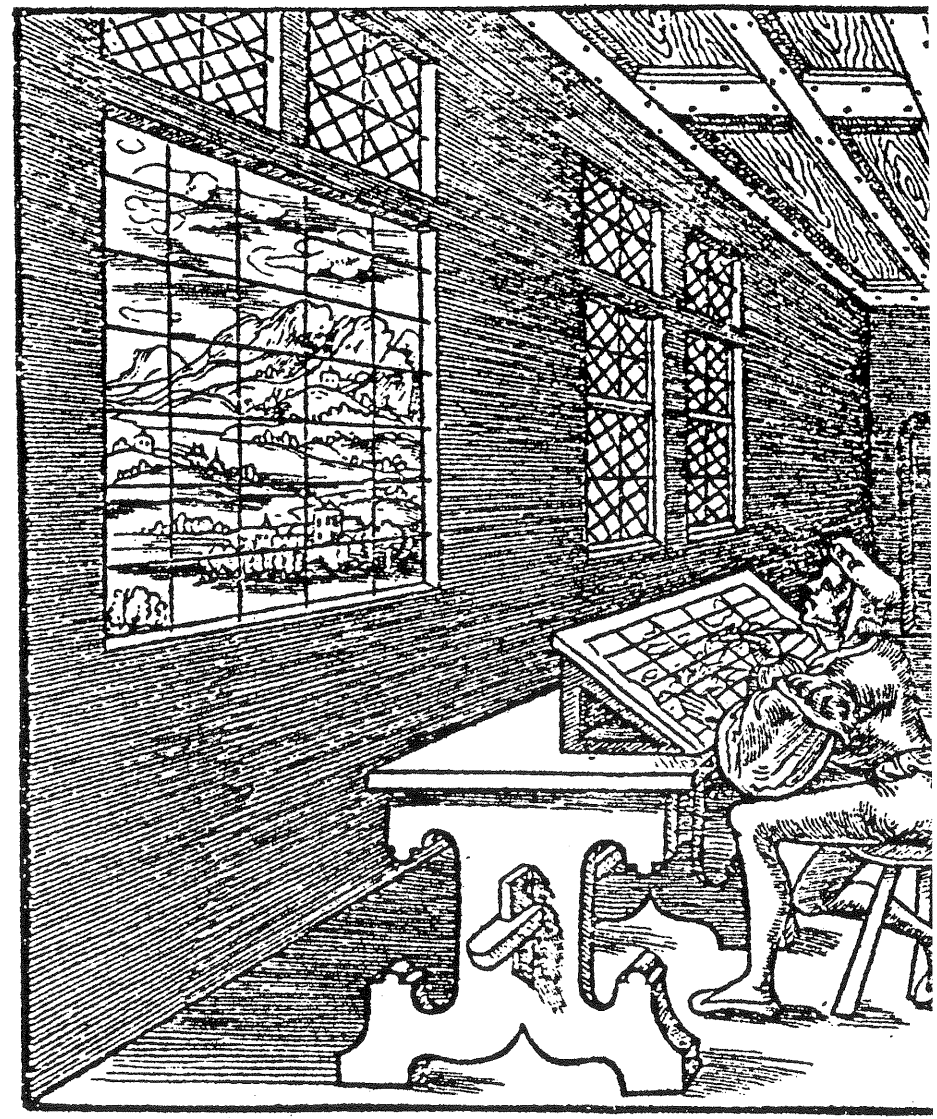
1.6 Woodcut illustration from Albrecht Dürer, *Underweysung der Messung* (Nuremberg, 1538).

1.7 Woodcut illustration from Albrecht Dürer, *Underweysung der Messung* (Nuremberg, 1525).

gendered difference between the holder of focal-point perspective and the massive three-dimensional subject of this perspective. While the window served as perspective's practical metaphor, the *velo* served as its practical instrument. Both relied on a frame, a rectangular aperture that was to hold the two-dimensional plane of the picture.

Although another sixteenth-century woodcut (figure 1.8) provides an excellent illustration of the use of the window itself as an aid in representation, it should be noted that the artist here uses the gridlike sections of the window as his drawing aid (the *velo* as window) instead of the mathematical formulas for perspective outlined by Alberti. Despite the different techniques of perspectival rendering, the common attribution of these devices as "windows"—often with marked neglect of their very different techniques—was based in the shared feature of a framed image—framed by the artist, seen in a frame by the viewer—facing a coherent spatial arrangement of objects in depth.

While the transparency of "seeing through" (*durchsehen*) the picture plane was shared by both the window and the *velo,* the picture surface was itself materially opaque.[57] A picture plane covered with layers of pigment became the



1.8 Woodcut illustration from Johann II of Bavaria and Hieronymus Rodler, *Ein schön nützlich büchlein und unterweisung der Kunst des Messens* (Siemern, 1531).

material logic of Western oil painting: the painter, following what Norman Bryson has termed an "erasive imperative," applied a thickness of paint that eclipsed the surface of the picture plane.[58] Hence the metaphoric transparency of the picture plane belied its material opacity. The opacity of the picture plane, and later—as I will discuss—the material opacity of screenic surfaces of the cinema, television, and computer screen form the necessary precondition for

virtual representation. The material opacity of the painting surface was already a step in the direction of a window with only a *virtual* transparency.

While the window was more of a metaphor than a mechanical apparatus, like other perspective devices, it served to transfer the skills of image-making from the artist to a mechanical aid. As Martin Kemp notes in *The Science of Art*, the "mechanical artlessness" of these "perspective machines" was criticized when they first appeared.[59] Alberti's and Brunelleschi's attraction to mechanical aids for drawing may have been an extension of their reliance on other medieval instruments—the quadrant and the astrolabe—used for surveying and measurement. As Kemp further notes, "sighting" devices for mapping and measurement led to later drawing machines like Cigoli's perspectograph and Scheiner's pantograph, devices which further automated the mechanics of representation for the draftsman. Although there were numerous treatises that described and illustrated the many variations of drawing devices and perspective "machines," their actual use in pictorial practice remains a matter of art historical debate.

THE METAPHYSICS OF PERSPECTIVE

PERSPECTIVE AS "SYMBOLIC FORM"

Erwin Panofsky, writing in 1924, found the metaphysics of perspective clearly recognizable. Although many writers have challenged crucial elements of Panofksy's account, his argument about perspective as "symbolic form" forcefully posits a modern sense of space (*Raumgefühl*) and sense of the world (*Weltfühl*) conditioned by "habituation" to looking at perspective constructions.[60] Borrowing a "felicitous" term from Ernst Cassirer, Erwin Panofsky describes perspective as a historically specific system of spatial representation, a "symbolic form."[61] In his "Perspective as Symbolic Form," Panofsky suggests that rather than presenting a correct rendition of reality, *perspectiva artificialis* presented instead a "rather bold abstraction from reality": "'central perspective' makes two tacit but essential assumptions: first, that we see with a single and immobile eye, and second, that the planar cross section of the visual pyramid can pass for an adequate reproduction of our optical image. In fact these two premises are rather bold abstractions from reality."[62] With such a "fundamental discrepancy between 'reality' and its construction," perspective transformed "psychophysiological space" into a "mathematical space," ordered and rational.[63] This new mathematical space was—to Panofsky—an "evolution" from the aggregate multiplicity of medieval and Gothic visual systems and at the same time a "return" to ancient variations on perspective.[64] In a sharp, descriptive passage on the representational surface, Panofsky suggests the transformative effects of this new sense of space on the picture plane:

> The surface is now no longer the wall or the panel bearing the forms of individual things and figures, but rather is once again that transparent plane through which we are meant to believe that we are looking into a space, even if that space is still bounded on all sides. We may already define this surface as a "picture plane," in the precise sense of the term. The view that had been blocked since antiquity, the vista or "looking through," has begun to open again; and we sense the possibility that the painted picture will once again become a section cut from infinite space, only a more solid and more integrally organized space than the antique version.[65]

And, in a remarkable comment delivered almost in passing, Panofksy suggests that our perceptual habituation to flat, noncurvilinear surfaces is "reinforced by looking at photographs": "And indeed, if even today only a very few of us have perceived these curvatures, that too is surely in part due to our habituation—further reinforced by looking at photographs—to linear perspectival construction: a construction that is itself comprehensible only for a quite specific, indeed specifically modern, sense of space [*Raumgefühl*], or if you will, sense of the world [*Weltfühl*]."[66] The fixity of the viewer's vantage—the picture seen from only one point in space—was an essential component of this new representational system of objects in space.[67] In the final section of his essay, Panofsky restates the import of perspective's translation of psychophysiological space into mathematical space—"In other words," he asserts boldly, "an objectification of the subjective."[68] Panofksy reduces this epistemological claim to an aphorism of twin "triumphs": "Thus the history of perspective may be understood with equal justice as a triumph of *the distancing and objectifying sense of the real* and as a triumph of the *distance-denying human struggle for control*."[69] The transformation of space, and its newfound unity through perspective, takes on a metaphysical significance and "finds its theoretical analogue in the view of space of contemporary philosophy."[70] Perspective, he writes, "is as much a consolidation and systematization of the external world, as an extension of the domain of the self. . . . [Through perspective] the 'claim' of the object . . . confronts the ambition of the subject."[71] Although Panofsky does not make the direct equation between the "ambition of the subject" and the Cartesian *cogito*, he hints at it: "And yet this view of space, even with its still mystical coloring, is the same view that will later be rationalized by Cartesianism and formalized by Kantianism."[72]

Panofsky's 1924 essay positions perspective as a change of human perception in a historical context—a cultural topos comparable to Thomas Kuhn's notion of "paradigm," Foucault's "episteme," or what Martin Jay (via Christian Metz)

will call a "scopic regime."[73] But if perspective was a historically specific "symbolic form," it too could pass as complex historical conditions change. In 1924, Panofsky writes about perspective on the cusp of the form's symbolic decline.

Here, it is striking how—as perhaps the only historian of perspective to also write about the moving image—Panofsky shied away from making the same forceful claims about the cinema as the new mode of viewing and representation of his century. If, as Panofsky suggests, perspective habituated its viewers, conditioning their perception of space and time, it would seem that his various talks and essays on the "movies," the "moving picture," or the "motion picture" might suggest that the moving image heralds a new "symbolic form." Yet Panofksy never makes this claim.

In November 1936, as a recent émigré to the United States and as a renowned art historian with a European pedigree, Panofsky gave a lecture entitled "The Motion Picture as an Art" in the bastion of tradition and high culture, the Metropolitan Museum of Art in New York. In June 1936, he published "On Movies" (taken from an informal lecture given in 1934), an essay that was revised and retitled "Style and Medium in the Moving Picture" and published in Eugene Jolas's expatriate American "little magazine" *transition* in 1937 alongside *Finnegans Wake* as a "work in progress." Panofsky revised the essay again in 1947 as "Style and Medium in the Motion Picture," and this widely circulated revision served to further legitimate the "motion picture as an art."[74] "Style and Medium in the Motion Picture" (1947) has long been included in film anthologies as a canonical example of the early theorization of cinema's specificity as a "medium," and yet it has only recently been brought into contrastive relation to Panofsky's art historical writing. Thomas Y. Levin notes the "virtually complete lack of serious scholarly work on Panofsky's film essay in the art historical secondary literature" and the corollary neglect in film studies where Panofksy's essay is "almost completely absent from the canonical historiography of film theory."[75]

Panofsky's interest in the newly evolving "moving" image figures in the larger historical confluence of the technical development of the moving image with the foundations of art history as a discipline in the late nineteenth century. Panofsky's essay begins: "Film art is the only art the development of which men now living have witnessed from the very beginnings."[76] His role alongside Siegfried Kracauer, another German émigré, at the first annual meeting of the Society of Cinematologists at the NYU faculty club in April 1960 suggests that Panofsky was an early representative of the changes to disciplinary boundary and method.

Although the title of Panofksy's essay indicates his concern with film "style," the essay has, as Levin points out, "a focus on content which almost completely disregards questions of cinematic form."[77] Nevertheless, Panofsky's incisive isolation of the twin qualities of cinematic specificity—the "dynamization of space" and the "spatialization of time"—suggests that he also had insights into the "medium." Panofsky tosses off his diagnosis of these "unique and specific possibilities" as "self-evident to the point of triviality."[78] But when held up to his writing on perspective as "a concrete expression of a contemporary advance in epistemology or natural philosophy," these chiasmic opposites begin to posit "the movies" as a new form of space-time perception, a post-perspectival "symbolic form."[79]

Another essay from 1936 made dramatic claims about the medium-specific qualities of film and consequent changes in perception. While not received as such at the time, Walter Benjamin's "Work of Art in the Age of Mechanical Reproduction" essay became a central piece of twentieth-century cultural criticism, a canonical essay marking new configurations of time and space in the "age" (read "episteme," "paradigm," "symbolic form") of "technical reproducibility." Panofsky's essay "On Movies" (written in English and published in June 1936) and Walter Benjamin's "Work of Art" essay (written in German in January/February 1936 and published in French in *Zeitschrift für Sozialforschung* later in 1936) seem in retrospect to mark a shared cultural moment of insight into the new medium.[80] Not only were both authors writing in a language that was not their own, they each were attempting to isolate the specificities of another new, and somewhat foreign, visual language.

Like Panofsky, Benjamin asserts the historicity of vision, that changes in perception are determined by and, in turn, determine their historical context. Benjamin's essay contains a sharp critique of the Viennese school of art historians (Alois Riegl and Franz Wickhoff) for not drawing conclusions about the social effects of these changes in perception:

> During long periods of history, the mode of human sense perception changes with humanity's entire mode of existence. *The manner in which human perception is organized, the medium in which it is accomplished, is determined not only by nature but by historical circumstances as well.* The fifth century, with its great shifts of population, saw the birth of the late Roman art industry and the Vienna Genesis, and there developed not only an art different from that of antiquity but also a new kind of perception. The scholars of the Viennese school, Riegl and Wickhoff, who resisted the weight of classical tradition under which these later art forms had been buried, were the first to draw conclusions from them concerning the organization of perception at the

> time. However far-reaching their insight, these scholars limited themselves to showing the significant, formal hallmark which characterized perception in late Roman times. They did not attempt—and perhaps, saw no way—to show the social transformations expressed by these changes of perception. The conditions for an analogous insight are more favorable in the present.[81]

Benjamin locates these changes in the "apperceptive apparatus" in the material conditions of urban life. "The film corresponds to profound changes in the apperceptive apparatus," he writes in a footnote, "changes that are experienced on an individual scale by the man in the street in big-city traffic, on a historical scale by every present-day citizen."[82]

In this regard, it is interesting to consider what Panofsky's essay did not claim: Panofsky did not suggest anything about the film viewer's perception, nor did he speculate on film's metaphysical or metapsychological effects. Rather, his film essay is often cited for an aphorism drawn in contradiction to the auteurist claim of single authorship: "It might be said that a film, called into being by a co-operative effort in which all contributions have the same degree of permanence, is the nearest modern equivalent of a medieval cathedral."[83] By contrast, Benjamin's invocation of architecture as an analogy for the film medium interrogated the "use and perception" of such buildings. His much-contested assertion that "Architecture has always represented the prototype of a work of art the reception of which is consummated by a collectivity in a state of distraction" led to his theorization of the "profound changes in apperception" represented in the film spectator.[84] I will return to Benjamin's discussion of the "distracted person" (*der Zerstreute*) when I discuss "multitasking" and its potential consequences for the contemporary "apperceptive apparatus."

Panofksy's writing on perspective had a split critical optic: he could clearly assert that perspectival representation conditioned the viewer's perception of space and time, but he would not make the same claims about the representational practices of his own age. Panofsky's visual acuity may have been a determinative: he was nearsighted in one eye and farsighted in the other. His eyesight may have formed a critical corollary to his own vision of the historical near and the historical far.[85]

THE CARTESIAN COINCIDENCE: "CARTESIAN PERSPECTIVALISM"

The "single and immobile eye" of perspective, as Panofsky terms it, enacted a fiction, a visuality at odds with vision. Its Cyclopean viewer remained fixed, focused, immobile. The frame of perspective produced a separation of the represented world from its viewer who, at an objectifying distance from it, was still able to measure its near and its far.

In this regard, the positioned view of single-point perspective has been frequently conflated—in a posited historical "coincidence"—with the metaphysical position of the Cartesian subject: centered and stable, autonomous and thinking, standing outside of the world. In all cases, the language of this equation—whether used by philosophers, art historians, or film theorists—bespeaks a historical elision, what I will call the Cartesian coincidence.[86]

Martin Jay notes this common equation between Cartesian metaphysics and the metaphysics of perspective and, "for convenience," names it—even as he marks its "radical dethroning"—as "Cartesian perspectivalism."[87] In his essay "The Scopic Regimes of Modernity," Jay characterizes a widespread and ongoing critique of perspective's implicit metaphysic for its "privileging of an ahistorical, disinterested, disembodied subject entirely outside of the world it claims to know only from afar."[88] Although perspective was, in Jay's account, "in league with" the "dispassionate eye" of "a scientific world view" and complicit with the bourgeois ethic of Florentine business, as the painting became a portable commodity in capitalist exchange, the oversight of the perspectivalist regime was such that "the bodies of the painter and viewer were forgotten in the name of an allegedly disincarnated, absolute eye."[89] Hence, the similarity between the viewer of perspective and the Cartesian "subject" is based on the implied separation of the viewer from the world viewed, the spectator from the spectacle. Jay challenges those who have invoked the combined optic of "Cartesian perspectivalism" as "*the* reigning visual model of modernity" and suggests, instead, that it was only one of several "scopic regimes" or "visual subcultures" in the modern era.[90]

Nevertheless, the combinant metaphysic "Cartesian perspectivalism" is a somewhat shaky conflation. The forced homology between perspective's fifteenth-century representational system and Descartes's seventeenth-century meditations on the separation of subject and object all too tidily elides the two centuries between Alberti and Descartes.[91] Unlike that of Alberti and other Renaissance theorists, Descartes's interest in optical processes and devices was deeply rooted in a philosophical skepticism about knowledge attained through the senses, particularly vision.[92] Deeply distrustful of perspective, Descartes was more interested in optical trickery and anamorphosis—how representations depart from reality—than in representations that attempt to offer a veridical reinstatement of it.

The devices and techniques for perspective that relied on the monocular "point" of view of the artist also assumed that the viewer would occupy an

equivalent position in relation to the image; that the viewer must apprehend the image from the same vantage as the painter. This conflation of "points" of view became of key importance to philosophers and is perhaps the reason that the philosophical paradigm of perspective may have overtaken its use as a practical device. For Descartes, and later for Heidegger, the "standing in front of"—observing from a fixed point in relation to a framed image—became equated with a philosophical position, a *Weltbild,* which transformed the world into a measurable object.[93]

Many recent debates about visuality have pitted Cartesian-based theories of *disembodiment*—which hold that the viewer is separate from the world, disincarnated in vision—against phenomenologically based theories of *embodiment,* which root sight in its bodily organ. But the term "embodiment" also cuts across theories of virtuality and accounts of how we experience realities that are mediated and virtual.[94]

In the next chapter, I will return to the representational transfer of the three-dimensional space of the phenomenal world onto the two-dimensional virtual plane of representation and examine the camera obscura—a perspective device often conflated with Alberti's window. The camera obscura will lead us to examine competing historiographical accounts of the relationship between Renaissance perspective and the photographic and moving image.