

CHAPTER TWO

THE FRAME

[figure 2-1, Vignola perspective drawing; 2-2; detail of camera obscura; 2-3 Descartes' retinal image from *La dioptrique*]

PERSPECTIVE AND THE CAMERA OBSCURA

The principles of pinhole projection, known in antiquity by Aristotle and Euclid, were described in the writings of the Arabic scholar Al-hazen in the 10th century and in John Pecham's perspective treatise *Perspectiva communis* of 1279.¹ Although Alberti may have been familiar with the principles of the *camera obscura*, he did not mention the device in *De Pictura*. Nevertheless, Alberti's metaphor of the window bears consideration in relation to the *camera obscura* as a device used to translate the phenomenal space of vision onto the virtual plane of representation. In this chapter, I examine the *camera obscura*, its relation to the window metaphor and its pivotal position in philosophical and historiographic debates about the production of images. Like the window, the *camera obscura* acquired the discursive weight of metaphor and, over centuries, its identity as a philosophical paradigm developed alongside—although somewhat separately from—its use as a technical apparatus. My concern here is not so much to provide an account of the *camera obscura*'s complex technical and discursive history, which has been discussed at length elsewhere, but rather to underline the functions of the *camera obscura* which exceeded its use as a drawing tool or a scientific instrument for veridical observation.² Here it will be important to emphasize the *camera obscura*'s relation to the long tradition of devices that relied on projected light in a darkened room and on a projected image produced for a viewer's delight—not with its verisimilitude— but with the *illusion* of verisimilitude. Here I will argue, that it was the fascination with *virtuality*—the near approximation of the real—that drove these inventions.

Like both Alberti's window metaphor and the reticulated net, the *camera obscura* helped the artist to transform the three-dimensional space of vision to the two-dimensional *virtual* plane of representation. But the nuance of difference between their techniques will become an important pivot as we consider their implications for producing and viewing photographic and moving images. The window frame and the *velo*- grid both positioned the artist to look *through* a frame in a frontal relation to the

painterly surface. As Alberti describes the *velo*: “I set this up *between the eye and the object to be represented*, so that the visual pyramid passes through the loose weave of the veil.”³ [emphasis added] While Alberti used the rectangular frame of his “window” as a means of geometric calculation, the *camera obscura* was a mechanical device that could render a perspectival image onto a picture plane without the need of mathematical calculation or geometric formula. And, unlike the Albertian window metaphor and the *velo*-net, the *camera obscura* **projected** its images—inverted and laterally-reversed—onto a planar surface. As we have seen in the last chapter, Alberti’s window was a metaphor predominantly for the frame, a rectangle for seeing through. His window had only a virtual transparency and hence was not an actual “window on the world.”

The *camera obscura* functioned much more like an architectural window: its pinhole aperture brought light from the outside into a darkened interior. Relying on light and its opposite—darkness—the *camera obscura* conducted the following piece of optical commerce: in a dark chamber penetrated by a tiny opening, a ray of light will carry—project onto the wall opposite the opening—an exact image, moving and in full-color, of the scene outside. The darkness and opacity of the wall becomes a receptacle for the light and transparency of the window aperture. Never mind that in this unmediated instance, the image will be inverted and laterally reversed: the outside is brought inside. The optical principle of the *camera obscura* performs an architectural exchange: the wall exchanges places with the window.⁴ The projective light of the *camera obscura* produced a *virtual* image, a frame of light that—via this “natural magic”—formed a *virtual* window upon the wall.⁵ Here, it is important to foreground this architectural model of visibility, the basic spatial construct of the *camera obscura*’s visual system. As projected light images became an entertainment medium, the optical principle of the *camera obscura* illustrates how light could carry images to this newly-virtual window.

Philosophers, art historians, film historians and cultural theorists have debated the epistemological and phenomenological effects of the *camera obscura* according to its two most commonly-ascribed functions— as a scientific instrument, and as a device for illusion. As an instrument used for celestial observation, the *camera obscura* had a veridical role in observation, recording and research. As a drawing tool, its use by painters as a “perspective machine” followed the same epistemic assumptions about its use as a device for making an accurate record of the visual world. But, as a device for

illusion, the optical principles of the *camera obscura* took on a different function, one that led to a different aspect of its virtual destiny.

As a projection device, the *camera obscura* repositioned the artist in relation to the picture plane. In his notebooks of 1490, Leonardo proposes a solution to the left-right reversal of the *camera obscura* image. Suggesting that the artist deploy a translucent paper screen viewed from the back, Leonardo found an arrangement that positioned the artist on the other side of the projection surface. This technique corrects the left-right reversal, but not the inversion. The artist still sees an inverted image, but the artist's head will not block the incoming light.⁶

In the centuries after Leonardo, the techniques of the *camera obscura* were detailed in a range of treatises on optics, light and perspective: Daniele Barbaro, *La Practica della Prospettiva* (1569); Giambattista della Porta, *Magiae naturalis* (1558); Johannes Kepler, *Ad Vitellionem Paralipomena* (1604); Athanasius Kircher, *Ars Magna Lucis et Umbrae* (1646). Kepler may have been the first to name the optical principle with the architectural description "*camera obscura*" -- an incisive term that indicated the reductive simplicity of the behavior of light entering a dark room.⁷ As we have seen, Kepler's theory of the retinal image, as described in *Ad Vitellionem Paralipomena* (1604), explained the optical principle of image-inversion, the retinal "picture" as a reverse and inverted version of the visual field.⁸

In the late 16th century, as lenses were added to its aperture, the *camera obscura* became a dioptric device which, like other optical instruments—the microscope and telescope-- negotiated vision by the use of lenses.⁹ In his 1637 treatise on lenses and refraction, *Dioptrics*, Descartes drew upon the *camera obscura* as model to demonstrate the analogy between the eye and the behavior of light in pinhole projection—a literal example of argument *ad oculum*. ("Now it is said that this room represents the eye; the hole, the pupil; the lens, the crystalline humour...."¹⁰) The shutter aperture—or as one translator indicates, the *fenestre*—was a refracting medium for the light which travelled through it forming a **virtual** image. [See "LENS I: Descartes' Window" for a further discussion of the window and lens in Descartes' epistemology.].

Dioptric instruments were crafted from the same brass, wood and glass materials as the measuring instruments of astrolabes, quadrants, thermometers, barometers. And yet instruments that used lenses served an additional function separate from those designed simply for geographical or astronomic measurement. Dioptric

instruments served to extend human vision, to magnify vision of the near or the far, but also to transform—or even distort—the objects within their view. Robert Hooke’s careful drawings of specimens seen through the microscope in *Micrographia; or, Some Physiological Descriptions of Minute Bodies Made By Magnifying Glasses* (London, 1665) illustrate both a refined precision of detail and his use of remarkably aestheticized pictorial strategies.¹¹ Galileo’s observations through the telescope led him to reject the reigning cosmology of geocentrism thus transforming the visual significance of the earthbound view toward the heavens.¹²

Here, in the most material sense, the technologies of glass and transparency—aided by developments in lens-grinding and glass-making technique—played a determinant role in the scientific transformation of the modern world. As Lewis Mumford would proclaim from a mid-20th century vantage: “Without the use of glass for spectacles, mirrors, microscopes, telescopes, **windows** and containers, the modern world as realized by physics and chemistry could scarcely have been conceived.” [emphasis added]¹³ Mumford places windows alongside dioptric instruments in his list of transformations implemented by glass. Drawing an analogy between the glass instruments of scientific observation and the easel painting, he invokes the metaphor of the window, not as a technique for perspective, but as a metaphor for aperture:

The world as conceived and observed by science, the world as revealed by the painter, were both worlds that were seen through and with the aid of glasses: spectacles, microscopes, telescopes, mirrors, windows. What was the new easel picture, in fact, but a **removable window opening upon an imaginary world?**¹⁴ [emphasis added]

The next chapter will examine developments in glass technology and the role of glass and its transparency in the context of the window’s architectural history. But here, as we consider the optical principles of lenses and apertures, it is necessary to emphasize the non-scientific role of the glass-enabled instrument. The telescope and the microscope may have served largely as instruments for scientific research, but they also began to serve another—albeit limited—use by amateurs as parlor entertainment.¹⁵ The entertainment function of these optical devices was reliant not only on the versimilitude of the images seen and the recording capacities of mediated vision, but also on the illusion of versimilitude, the very *virtuality* of the experience produced.

By the 17th century, knowledge of the *camera obscura* was widely spread.¹⁶ Here, the recent controversy about whether—and to what degree—painters relied on the *camera obscura* and other optical devices points us to a slightly different, but related, set of historiographic concerns.¹⁷ For decades, art historians have debated whether or not Dutch painter Johannes Vermeer used lenses or optical devices like the *camera obscura*.¹⁸ As Philip Steadman asserts about the paintings of Vermeer: “I can think of no plausible explanation as to why any mathematical perspective method should produce [these] results ... which are so straightforwardly and simply accounted for by a camera technique.”¹⁹ Quite simply, as a drawing device the *camera obscura* was a much simpler tool than the book-laden geometrics of perspectival technique. David Hockney’s 2001 study, *The Secret Knowledge: Rediscovering the Lost Techniques of the Old Masters* proposes that by the 16th century artists were routinely using the apparatus of a *camera obscura*.²⁰ Hockney asserts that linear perspective techniques cannot explain the folds of fabric or the shine on metals in paintings such as Jan Van Bylert’s *Man in Armour holding a Pike* (c.1630) and that Dürer’s 1525 perspective machine could not have aided in Holbein’s *The Ambassadors* (1533). In this controversy, the common rejoinder to the claims of Hockney and others is to question whether there is any evidence—other than an analysis of painterly stylistics—which would offer testimony to the use of an optical device.²¹ The debate about the putative and/or prevalent use of the *camera obscura* serves to illustrate the differences between the representational device of the *camera obscura* and the perspectival “window,” how each technique bears its own representational consequences, and how each has met a separate historiographical fate.

While somewhat suspicious of claims about its actual use as a picture-making device, art historian Svetlana Alpers claims that the *camera obscura* was a “source of style” for Dutch artists in the 17th century.²² In her 1983 book, *The Art of Describing: Dutch Art in the Seventeenth Century*, Alpers draws a broad distinction between the narrative “perspectival” art of the Italian Renaissance—often the defining tradition of Western art—and that of the more descriptive “optical” art of Northern Dutch painters. In Alper’s account, the “northern mode” of painting is distinct from the “Albertian mode” and can be characterized by “the absence of a **prior frame**—that rectangle or framed window which Alberti offers as his initial definition of the picture—so that the image spread out on the pictorial surface appears to be an unbounded fragment of the world that continues beyond the canvas.”[emphasis added]²³

Dutch or “northern” visuality presented “an aggregate of views,” fragmentary, arbitrary framing unlike Italian or “southern” visuality represented by the Albertian rectangle of an open window.²⁴ Although Dutch painters might share the cartographic grid and mapping impetus of Mercator with the painters of the Italian Renaissance, Alpers asserts “they do not share the positioned viewer, the frame, and the definition of the picture as a window through which an external viewer looks.”²⁵

Alpers bases much of her argument on “the sweep of a panoramic landscape that continues beyond the arbitrary rectangle of the canvas” in the paintings of Pieter Saenredam, Jan van Eyck and others, yet she grounds her claim that *camera obscura* is “paradigmatic of Dutch images” in a specifically Northern “cultural ambience” which imparts “a trust to devices, to intermediaries that represent nature to us.”²⁶ In her reading it was the Dutch trust in lenses, while not a direct influence on painters, that became a determinant factor in painterly style.²⁷ At stake in Alper's broad oppositions—narrative/descriptive, perspectival/optical, Albertian/Keplerian—is the concept of a specifically “Dutch visual culture” a regional subvariant to art historical generalizations radiating from the Italian Renaissance.²⁸ Alpers finds this “cultural ambience” evident in the writings of Constantijn Huygens and in the optical research of Johannes Kepler.²⁹ While Alpers does not claim that Kepler had a direct influence on Dutch painters (in fact she argues to the contrary—she admits that Hoogstraten and Huygens doubted his findings), she asserts that Dutch art was produced in “the Keplerian mode.”³⁰

While the unbounded “descriptive” aspects of Northern painting may form a stark contrast to paintings by their Italian counterparts, the Keplerian optics of mediation through lenses and optical devices also points to another effect, other than easel painting, of 17th century representational practices. Dutch artists used the principles of the *camera obscura* to create “peep”-boxes (*perspectifkas*) where viewers “outside the box” would look into a box to see a perspectively-constructed room.³¹ Peep-boxes perform a complex set of illusions: an attraction to looking in and not out, to miniatures reduced in spatial versimilitude, to using the monocular eye, not the frame, as a determinant of vision.

[figure 2-3; Hoogstraten peep-box]

Whether or not the *camera obscura* was a widely-used optical tool for painting, the viewing practices associated with the *camera obscura* will become an important component of cinematic and “post-cinematic” viewing. As Alpers notes:

We are so accustomed by now to associating the image cast by the camera obscura with the real look of Dutch painting (and after that with photography) that **we tend to forget that this was only one face of the device. It could be put to quite different uses....**One of the other wondrous devices... was a **magic lantern show** similar in construction to the camera obscura but with a human performance in view.³² [emphasis added]

THE CAMERA OBSCURA: PERSPECTIVE MACHINE OR PROJECTION DEVICE

Here I turn from a consideration of the representational consequences of techniques for perspective and the optical device of the *camera obscura*, to an assessment of the position of its viewer. In his landmark 1990 book, *Techniques of the Observer*, Jonathan Crary draws an explicit distinction between the effects of the *camera obscura* and linear perspective based on the position of the viewer of its images:

Obviously the two [camera obscura and linear perspective] are related, but **it must be stressed that the camera obscura defines the position of an interiorized observer to an exterior world, not just a two-dimensional representation, as is the case with perspective.** Thus the camera obscura is synonymous with a much broader kind of subject-effect: it is about far more than the relation of an observer to a certain procedure of picture making. Many contemporary accounts of the camera obscura **single out as its most impressive feature its representation of movement....** Thus the phenomenological differences between the experience of perspectival construction and the projection of the camera obscura are not even comparable.”³³ [emphasis added]

[figure 2-4; from Athanasius Kircher, *Ars Magna Lucis et Umbrae*, (Rome, 1646) in Getty collection microfilm]

For Crary, the *camera obscura* is “inseparable” from this “metaphysic of interiority.”³⁴ In the engraved illustration to Kircher’s *Ars Magna Lucis et Umbrae*, [seen

in figure *above], the artist or viewer is shown to be on the *inside* of a cross-sectioned box-like chamber. We will return to this “interiorized observer” in a moment when we examine the range of sizes and material manifestations that the *camera obscura* took on as a device. In its larger format--the tent or booth--the *camera obscura* would have an enclosed observer as Crary suggests, but the smaller devices position the observer outside of its box. Either way, the observer was positioned in front of the *camera obscura*'s projected light; and as light was brought through its aperture, it carried moving images on its rays. The second “phenomenological difference” between the *camera obscura* and linear perspective provides a more important distinction. The images produced by the *camera obscura*-- whether seen from inside its box or in front of the box's projected light--offered more than the rendition of three-dimensional space onto a two-dimensional plane. The images produced by the *camera obscura* were moving images. And this image of movement was distinctly separate from its source: it was *virtual* movement viewed by an immobile viewer.

And it is here—in the moving images produced by the *camera obscura*—that I return to the polemic that began this chapter. As a drawing tool, the *camera obscura* aided the artist in the static rendition of its projected image. But in the late 16th/early 17th century, the *camera obscura* began to take on quite another function. In Giambattista della Porta's treatise *Magiae naturalis* (1558) and in Athanasius Kircher's *Ars Magna Lucis et Umbrae* (1646) the *camera obscura* was celebrated for its potential to project images which could confuse and delight. A citation from the 1658 English edition of della Porta's 1558 Latin text will provide an insight into the method and intention of its use. In an instructive section, “How in a Chamber you may see Hunting, Battles of Enemies, and other delusions,” della Porta writes:

Now for a conclusion I will add that, then which nothing can be more pleasant for great men, Scholars, and ingenious person to behold; That in a dark chamber by white sheets objected, one may see as clearly and perspicuously, as they were before his eyes, Huntings, Banquets, Armies of Enemies, Plays, and all things else that one desireth..**Let there be overagainst that Chamber, where you desire to represent these things, some spacious Plain, where the Sun can freely shine: Upon that you shall set Trees in Order, also Woods, Mountains, Rivers, and Animals, that are really so, or made by Art, of Wood, or some other matter.** You must frame little children in them, as we

bring them in when Comedies are Acted: and **you must counterfeit Stages, Bores, Rhinocerets, Elephants, Lions, and what other creatures you please:** Then by degrees they must appear, as coming out of their dens, upon the Plain: The Hunter he must come with his hunting Pole, Nets, Arrows, as other necessities, that may represent hunting: Let there be Horns, Cornets, Trumpets sounded: **those that are in the Chamber shall see Trees, Animals, Hunters Faces, and all the rest so plainly, that they cannot tell whether they be true or delusions:** Swords drawn will glitter in at the hole, that they will make people almost afraid. I have often shewed this kind of Spectacle to my friends, who much admired it, and took pleasure to see such a deceit; and I could hardly by natural reasons, and reasons from the Opticks remove them from their opinions, when I had discovered the secret.[emphasis added]³⁵

Della Porta's insistence on the "counterfeit" and the "pleasure to see such a deceit" illustrate that the *camera obscura* was not merely a scientific instrument. It was a device for illusion and entertainment.

In the 17th century, as portable versions became more common, the *camera obscura* was crafted into a variety of forms-- wooden boxes fitted with lenses used as drawing aids, but also as devices for illusion. As is evident in the illustrations to Johannes Zahn's *Oculus artificialis teledioptricus*, the magic lantern and *camera obscura* had very similar construction.³⁶

[figure 2-5; detail of a *camera obscura* from Johannes Zahn, *Oculus artificialis teledioptricus*, Würzburg, 1685]

[figure 2-6; detail of magic lantern from Johannes Zahn, *Oculus Artificialis Teledioptricus* (1685 and 1702). Zahn perfected Kircher's optical lantern with the above device which used glass slides mounted on a circular disc; when the disc revolved, the projected images could provide the impression of movement. In the same text, Zahn has designs of portable *camera obscuras*, devices with similar wooden boxes, lenses.]

Having underlined the historical emergence of the projective aspect of the *camera obscura*'s optical principle, let's return to Jonathan Crary's *Techniques of the Observer*. In the last decade or so, in the wake of Crary's book, the *camera obscura* has acquired a newly-valenced position. Crary's methodological stake in the "historical construction" of vision marked an important shift from the art historical tradition of stylistic or

iconographic analysis (as evidenced in accounts from Wölfflin to Panofsky) to a new assessment of an “observing subject.”³⁷ Crary’s attention to the “observer” as “a subject who is both the historical product and the site of certain practices, techniques, institutions and procedures of subjectification...one who sees within a prescribed set of possibilities, one who is embedded in a system of conventions and limitations” formed an exemplary model for describing the visual practices and habits of vision of the contemporary movie-goer, tv-viewer, computer user, driver.³⁸

Crary’s supple argument effectively challenged the familiar lineage that lead from the *camera obscura* to photography and cinema, productively questioning the reductive teleologies which had been the core narratives in histories of photography, modernist painting, and cinema.³⁹ And yet, I need to trouble Crary’s account of the broad epistemic differences between the optical system of the *camera obscura* (which he locates as the model for the 17th and 18th century observer) and the optical systems of the stereoscope and the *phenakistiscope* (which he locates as the model for the nineteenth century observer) in order to demonstrate that cinematic visuality was a combination of both of these models of vision—a visual system more complex than Crary’s model of rupture and discontinuity might suggest.⁴⁰ Here it seems that Crary’s model of two successive epistemes—17th/18th vs. the 19th—becomes nearly as reductive as the model he criticizes. Crary’s dismissal of the co-existent and continuous use of the *camera obscura* model of vision—through the 19th century and well into the 21st—effectively obscures the importance of the projective tradition of the *camera obscura*, of the architectural model of visuality and its place in the production of virtual images.⁴¹ Crary avows the use of the *camera obscura*’s principle of projected light as a device for illusion, but dismisses the importance of these devices:

The magic lantern that developed alongside the *camera obscura* had the capacity to appropriate the setup of the latter and subvert its operation by infusing its interior with reflected and projected images using artificial light. **However, this counter-deployment of the *camera obscura* never occupied an effective discursive or social position from which to challenge the dominant model I have been outlining here.**⁴² [emphasis added]

Yet it is precisely this “counter-deployment” of the *camera obscura*, the centuries-long tradition of projected images that has been at the core of recent film historical writing and research.⁴³ The magic lantern tradition has long been a component pre-histories of

cinema.⁴⁴ From the magic lantern shows of the mid-17th century (detailed in Kircher's text) to the *eidophusikon* of the late 18th century (Philip Jacob de Louthenberg, 1781) and the *phantasmagoria* (Etienne Gaspar Robertson 1797-1800) to the projection of photographic slides and illustrated lectures of the 1850s and 1860s, projection devices that relied on the darkened room and the projection of light onto a surface held for viewing had continuous use by scientists and showmen alike. Charles Musser has called this tradition of screen-based entertainments "screen practice," a term which maintains the importance of the screen as a key component of the cinema's visual system.⁴⁵

Laurent Mannoni's recently translated *The Great Art of Light and Shadow* (2000) and Deac Rossell's *Living Pictures: the Origins of the Movies* (1998) provide ample evidence of an "effective discursive or social position," i.e., the continued cultural and epistemic centrality of the projection of light and images.⁴⁶ While Mannoni is careful to correct many erroneous historical attributions--della Porta did not invent the *camera obscura*, Kircher did not invent the magic lantern, Robertson did not invent the *phantasmagoria*--his account is emphatic about continuous tradition of projected light images (dark room, white screen, illuminated image) from the 17th century through to the 19th.⁴⁷

Importantly, the projected light images of the *camera obscura* retained the elements of **movement missing in painting**.⁴⁸ As lantern techniques were developed for projecting painted slides and for animating painted images by moving slides and moving the lantern, a live entertainment form was adapted for audiences who sat in front of projected images. Although these visual practices were inaugurated in the 17th century, they continued to develop as a cultural practice well into the 19th century and beyond. As Mannoni asserts: "The lantern was never so much in demand, so widely sold, so much *à la mode* as in the second half of the nineteenth century."⁴⁹ The continuation of projected light entertainment based on the visual model of the *camera obscura* troubles Crary's tidy account of a shift in visuality.⁵⁰ The *camera obscura* may have provided the artist with a "perspective machine" (indeed the resistant reaction to the prevalence of its use may point to a contemporary anxiety about machine-aided representation) but it also became a "viewing machine" that imported—reproduced—exact, full color, moving images onto a two-dimensional surface for viewing.

In 1845-46 Karl Marx and Fredrick Engels famously drew upon the *camera obscura* as an optical metaphor in *The German Ideology*:

If in all ideology men and their circumstances appear upside-down as in a *camera obscura*, this phenomenon arises just as much from their historical life-process as the inversion of objects on the retina does from their physical life-process.⁵¹

The inversion of “men and their circumstances” in the *camera obscura* implies that there might be a positivist alternative to illusions of ideology. Many commentators have remarked on the paradoxical timing of Marx and Engel’s metaphor⁵². Marx ridicules the *camera obscura* at the very moment its apparatical extension—the photographic camera—was seen as veridical. A few sentences before this passage of *The German Ideology*, Marx and Engels assert that the production of ideas is “directly interwoven with the material activity and material intercourse of men (sic), the language of real life.”⁵³ In historically materialist terms, in 1845-46, the years that *The German Ideology* was written, William Henry Fox Talbot had just produced *The Pencil of Nature* 1844-1846. Given our discussion of the contradictory functions of the *camera obscura*—as scientific instrument and device for illusion—Marx found its dual nature to be a perfect visual analog to the invisible workings of ideology. While 1845 was a year that marked photography’s introduction as an instrument for exact drawing of the natural world (the “pencil of nature”) and hence it would seem odd to question the mediating effects of the *camera obscura*, 1845 was also at the height of the magic lantern’s popularity as a projective technique for illusion.

The darkened chamber of the *camera obscura*—whether the size of a room or the size of a portable box—contained transient images projected onto one of its walls by light from the exterior. While teleologists may debate a centuries-long desire to “fix” the transient image, it wasn’t until the perfection of light-sensitive chemicals in the early 19th century that it was possible to retain the rays of light on a surface. “It is often said that it was the painters who invented Photography, (by bequeathing it their framing, the Albertian perspective, and the optic of the *camera obscura*),” declares Roland Barthes, “I say: no it was the chemists.”⁵⁴

THE CAMERA OBSCURA and THE PHOTOGRAPHIC CAMERA

[figure 2-7; Nicéphore Niépce, "View from the Window at Gras" (1826); reproduction of heliograph]

The decisive moment undoubtedly came with the discovery of the first scientific and already, in a sense, mechanical system of reproduction, namely perspective: the *camera obscura* of DaVinci foreshadowed the camera of Niepce. The artist was now in a position to create the illusion of three-dimensional space within which things appeared to exist as our eyes in reality see them.⁵⁵

--André Bazin, "The Ontology of the Photographic Image" 1945

Nicéphore Niépce's view from his window, a view captured on pewter plate in 1826, has become the canonical "first image," claimed by many photo-historians as the earliest extant photograph. For Niépce's eight-hour exposure, the window was convenient as a site, its view framed and held static to be fixed in a virtual fashion. As Niépce wrote to his brother while experimenting with the process:

I placed the apparatus in the room where I work facing the birdhouse and the open casement...and I saw on the white paper all that part of the birdhouse which is seen from the window and a faint image of the casement which was less illuminated than the exterior objects.⁵⁶

Niépce, who named his process *heliography* to emphasize the determinant role of sunlight in image inscription, placed his camera-box at the best source of light—his window. In the resultant image, the frame of the window becomes the frame of the image; its open casement is transformed into a framed image of a window. And yet, Niépce's "view from his window" may too easily encourage a conflation between the perspectival metaphor of Alberti's window and the *camera obscura*. The opacity of the photo-sensitive surface captured the window's view on a picture plane possessing only a **virtual** transparency. Here, as elsewhere, transparency serves as a metaphor for opacity. In this case, the photograph of Niépce's window did not frame a transparent plane for *seeing through* but, rather, uses its frame to encase a surface, its virtual substitute.⁵⁷

The image of another window forms one of the earliest surviving paper negatives: Fox Talbot's Oriel window from the South Gallery of Lacock Abbey, Wiltshire dated August 1835. Fox Talbot put photo-sensitive paper inside a *camera obscura* constructed from a large box and placed the camera outside facing the building's

window. The resulting image shows the negative effect of light in the leaded glass panes of the window; the mullions are white, the panes are black.

[figure 2-8; Henry Fox Talbot, Oriel window from the South Gallery of Lacock Abbey, Wiltshire dated August 1835]

In his 1945 essay, “The Ontology of the Photographic Image,” film theorist André Bazin concisely recited the common equation between the representational ontology of the *camera obscura* and the image produced by the photographic camera: “the *camera obscura* of DaVinci foreshadowed the camera of Niépce.” Bazin’s passage offered a symptomatic account—often repeated by historians and theorists of photography and moving image media—of the headlong teleology between the *camera obscura* and the cinematic camera.⁵⁸ Because Bazin’s “ontology” held its faith in film’s referential realism, his writing has served as a theoretical benchmark for the claim that the cinematic medium was an evolving component of a technological grail --the representation of the “real.” In another short essay written the following year, “The Myth of Total Cinema,” Bazin asserted that there was a “guiding myth,” an “idée fixe,” that led to cinema’s invention. “In their imaginations,” Bazin wrote of cinema’s inventors, “they saw the cinema as a total and complete representation of reality...an *integral realism*, a recreation of the world in its own image.”[emphasis added]⁵⁹ Bazin made a special case for the “true realism” of photography over and against painting, which he variously characterized as having a “resemblance complex,” an “obsession with likeness,” an “appetite for illusion.” “Perspective was the original sin of Western painting,” Bazin declared, “It was redeemed from sin by Niépce and Lumière.”⁶⁰ In Bazin’s logic, the photographic camera fulfilled a redemptive ontology: the “sin” of perspective’s illusion was redeemed by the camera’s reality. As a device with an “impassive lens” which could “lay bare the realities,” the photographic camera—not Alberti’s metaphoric window—threw open the sash to an unmediated view of the world.⁶¹

While Bazin’s version of the genealogy from perspective to the *camera obscura* to the photographic image was drawn in service of an argument about the realism of the photographic image and the “transparent” un-mediating role of the photographic camera, his formulations were echoed in service of a very different—and much less celebratory—set of arguments by “apparatus” film theorists Christian Metz, Jean Louis Baudry, Jean Comolli, Stephen Heath and others in the 1970s.⁶² Theories of the

“apparatus” sought to characterize the specificities of a cinematic *dispositif*-- its instrumental “technical base” but also its metapsychological effects on the spectator.⁶³ Emerging from the post-1968 force-fields of structural linguistics, Althusserian Marxism, and psychoanalysis, “apparatus film theory” of the 1970s turned away from the reigning auteurist, new-critical, and sociological approaches to film analysis and offered, instead, a theoretical account of the film spectator as “subject.” While each of the “apparatus” theorists emphasized a different aspect of cinematic signification, like Bazin, they each assumed a direct and unquestioned genealogical continuity between Renaissance perspective, the *camera obscura*, and the photographic camera. Bazin and apparatus theorists assigned the same spectatorial effects to perspective (its “man-made” codifications to vision) and to its less mathematically rule-bound apparatical cousin, the *camera obscura*. Let us return to these premises in order to untangle the common conflations and confusions between three separate representational devices of perspective: the *camera obscura*, the photographic camera, and the moving image camera.

Perspective and the camera obscura of “apparatus theory”

The *camera obscura*, Jean-Louis Baudry proclaimed in his 1970 essay “The Ideological Effects of the Cinematic Apparatus,” “coincides exactly” with the birth of Western science and “will serve in the same period to elaborate in pictorial work a new mode of representation, *perspectiva artificialis*.”⁶⁴ Baudry’s statement of dramatic coincidence may have confounded the historical relation between the *camera obscura* and perspective. The “birth” of Western science (commonly situated in the 17th century) and the instrument of the *camera obscura* (most widely known by the 17th century) occurred two centuries after *perspectiva artificialis*—a 15th century development. The subtle differences between the geometric formulas of *perspectiva artificialis* as exemplified by Alberti’s window metaphor and the projective light of the *camera obscura* require uncoupling from the historical conflation “coincides exactly.”

In the “Ideological Effects” essay, Baudry offered a densely reductive account of a genealogy which locates the photographic camera in direct descent from the *camera obscura* and images organized in Renaissance perspective: “Fabricated on the model of the *camera obscura*, it permits the construction of an image **analogous** to the perspective projections developed during the Italian Renaissance.”⁶⁵ [emphasis added]

Unlike the “discontinuous and heterogeneous” space of the Greeks “based on a multiplicity of points of view,” the “centered space” of the Renaissance painting presents a “motionless and continuous whole,” a “**virtual image**” which, Baudry wrote, “provides a tangible representation of metaphysics.”⁶⁶ The photographic camera takes the optical principle of the *camera obscura* to produce its images, which are then seen as “analogous” to perspective projection. The phrase from *The German Ideology* (“If in all ideology men and their circumstances appear upside-down as in a *camera obscura*....”)—circulating as an idiom of Althusserian Marxism—played a key role in imagining the ideological nature of the cinema as an optical device.⁶⁷ For Baudry and other apparatus theorists of the 1970s, the image produced by perspective and by the camera was implicitly tainted with the ideology of the producing device.

It is necessary to underline two essential components of Baudry’s account which subtend his analogy between perspective and photography: 1) that the centered space of perspective and the monocular aperture of the camera both have a singular “point of view,” instead of multiple view points for the spectator; and 2) that perspective and the photographic camera both produce—Baudry used the term taken from optics—a **virtual image**. Baudry accompanied his discussion with a geometric diagram using diagonal lines and arrows to indicate the disposition of the spectator, screen, projector, and “objective reality.”⁶⁸ By emphasizing the relation between the fixed position of the viewer of Renaissance perspective and the fixed position of the cinematic spectator, Baudry argued that this *fixity*, inscribed into the camera’s apparatus, carried with it an ideological positioning for the spectator.

Historian and theorist of perspective Hubert Damisch archly protested this ideological reading. In the preface to his *The Origin of Perspective*, Damisch seemed to target Baudry and others:

A curious polemical debate took shape in these fields in Paris in the 1970s....Basing their arguments.....on the fact that the photographic box, and the camera which is its technical extension, function optically in a way wholly consistent with so-called one-point perspective....some maintained that photography and film disseminate spontaneously and so to speak mechanically, bourgeois ideology (because perspective, having appeared at the dawn of the capitalist era, must of necessity be essentially “bourgeois”) while others (sometimes the same individuals) celebrated the pallid attempts of would-be

experimental cinema to free itself from the “tyranny” of the single point of view and from the general constraints of perspective. Against which still others protested vigorously, citing perspective’s scientific status as a means of defending it against accusations of its being an ideological tool.⁶⁹

Damisch succinctly (yet without naming names) summarized Baudry’s account of the “ideological effects” of the “basic cinematographic apparatus,”⁷⁰

This debate is now an old story. But it has left copious traces behind it. It is frequently misclaimed that perspective, through the intermediary of the camera obscura, functions like ideology as understood by Marx. While both of these, in the last analysis, rely on similar reasoning, **the operation of perspective nonetheless differs from that of the camera obscura** in two fundamental respects: first, it is not based on the play of shadow, but rather requires bright light if it is to produce its effect; second, it in no way dictates an upside-down reversal, only the simple possibility of turning the image from left to right, which poses an entirely different problem.⁷¹ [emphasis added]

In Baudry’s account, the *camera obscura* was here undifferentiated from other techniques for perspective that did not produce a lateral or upside-down reversal. Damisch’s reaction to this debate seemed largely concerned with disentangling the effects and operation of the *camera obscura* from those of perspectival technique, but he also held a larger stake in decoupling ideological critique from its historical vicissitudes:

To discuss perspective in terms of ideological critique is to foreclose all possibility of understanding its historical fortune, as well as the efforts of humanism, over almost a century, to bring it into conformity with its own standards, those-- precisely—of ideology.⁷²

For Damisch, perspective is a “paradigm,” a structure which can “traverse history—or collide with it.” His mention of “*The pallid attempts of would-be experimental cinema to free itself from the “tyranny” of the single point of view....*” likely referred to the late 1970s film-work of “structural-materialist” filmmakers and their claims for challenging the ideological holds of classical spectatorship.⁷³ Without invoking “ideological critique,” American filmmaker Stan Brakhage had earlier, in 1963, polemically defied the “man-made law” of perspective in his manifesto *Metaphors on Vision*:

Imagine an eye unruled by man-made laws of perspective, an eye unprejudiced by compositional logic, an eye which does not respond to the name of everything

but which must know each object encountered in life through an adventure of perception.⁷⁴

[figure 2-9; film strip from camera-less film, *Mothlight*, Stan Brakhage, 1963]

Brakhage's project imagined the perceptual expansions of "an eye unrul'd." In his handpainted or non-photographic films, Brakhage eliminated the perspectival taints of the photographic camera and lens as mediator to the movement of projected light. Yet his filmmaking was still reliant on the spectatorial conditions of a darkened room and a viewer facing framed luminous moving images projected onto a screen. As films complicit with the conditions of exhibition and display, they rely on the projective properties of light in a dark room.

Although I've isolated Baudry in the discussion so far, he was not alone in invoking the direct teleology from Renaissance perspective to the cinema or in suggesting that it required fundamental critique. The relation of the photographic camera to Renaissance perspective was a broadly-circulating axiom in much French and British post-1968 film theory. Christian Metz allied his account of the spectator as an "all-perceiving subject" (*le sujet tout-percevant*) with "analyses of quattrocento painting or of the cinema itself which insist on the role of monocular perspective (hence the camera) and the 'vanishing point' that inscribes an empty emplacement for the spectator-subject."⁷⁵ In his 1976 essay, "Narrative Space," Stephen Heath summarized this position by quoting from a 1969 interview with Marcelin Pleynet which describes the camera as: "productive of a perspective code directly constructed on the model of the scientific perspective of Quattrocento."⁷⁶ In this way, Heath claimed Renaissance perspective as a foundational basis for both photographic and cinematic camera, "a machine for the reproduction of objects (of solids) in the form of images realized according to the laws of the rectilinear propagation of light rays, which laws constitute the perspective effect."⁷⁷ Maintaining that Quattrocento codes of perspective were inherent in the camera, he declared: "photography and cinema share the camera."⁷⁸

Like Baudry, Heath's account of the Renaissance roots of cinematic representation emphasized the role of "central projection" and its "fixed centrality" for the spectator.⁷⁹ Although the Albertian metaphor of the window may have been lurking in some of the other apparatus accounts of the perspectival positioning, Alberti's window made a manifest appearance in Heath's "Narrative Space":

“What is fundamental is the idea of the spectator at a window, an *aperta finestra* that gives a view on the world—**framed, centred, harmonious (the *istoria*)**.”⁸⁰

[emphasis added]

For Heath, the frame of the camera reproduces the frame of Alberti’s metaphoric window, offering a view that is framed and centered. He continued with the window metaphor, citing Leonardo DaVinci’s passage about the transparent pane of glass:

The pane is at once **a frame, the frame of a window, and a screen**, the area of projection on which what is seen can be traced and fixed; from the Quattrocento on, the ‘pane’ delimits and holds a view, the painter’s canvas as a screen situated between eye and object, point of interception of the light rays.⁸¹

[emphasis added]

In the critique of Baudry and Heath, it was the film *frame* that organized the spectator’s vision. As if in a relay of reference, the frame of perspective, the frame of the camera, the frame of the screen all form a fixed and “centered” view for the spectator.

As Heath wrote:

In so far as it is grounded in the photograph, cinema will contribute to the circulation of this currency, **will bring with it monocular perspective, the positioning of the spectator-subject in and identification with the camera as the point of a sure and centered embracing view**.⁸² [emphasis added]

Even if the equation between the eye and the camera is not exact—vision is binocular, and the eye’s scanning movements means that vision is not static—Heath asserts that it has been the “**ideological force of the photograph**” to “**ignore**” these aspects of vision. In a key insight into the paradoxical nature of the moving image, Heath noted:

It may well be that classically cinema acquires ‘the mobility of the eye’ while preserving the contained and delimited visual field on which ‘correct’ perspectives depend, but mobility is nevertheless difficult: movements in figures ‘in’ film, camera movement, movement from shot to shot...⁸³

I will return to this paradox between the fixity of the frame and the mobility of the image in a moment, but first I will need to conclude my review of apparatus theory and its account of perspective, and the fixed position implied by the frame itself.

The Frame

The exact origins of the picture frame are somewhat indistinct, but the frame became a component element of the painting when the painting became independent from its wall. The technique of fresco painting—in which pigments are applied directly onto the wet lime plaster of a wall—had been a practice for 15,000 years, evidenced in the cave paintings of Lascaux, France and Altamira, Spain, in dynastic Egypt, in the Roman frescoes of Pompei in the first century AD; it was prevalent in both Asian and Eastern European civilizations. In a material sense, fresco painting meant that the painted surface remained fixed to the original site on which it was painted. As historian Claus Grimm has said: “The question whether in classical times or in the early Middle Ages there were “frames” in our sense of the word, cannot be answered.”⁸⁴ Paintings on wooden panels or stone slabs were portable and could be set up in public meeting halls, thermal baths and temples. In the 13th century, once a painting was set on or in front of an altar table (*tabular antependia*), it became a movable object, separate from the wall. And, when panel paintings were detached from their base on altars to be carried in a religious procession, the frame permitted the painting to become not only separate from the wall, but mobile as well.⁸⁵ In the 13th century, as Grimm indicated, even if the form of the frame only consisted of flat and beveled pieces, its representational tendencies exceeded its function as “mere spatial demarcation.”⁸⁶ The painting’s frame acquired its own representational function—matching the motifs and materials of portal surrounds, doors and window jambs. The frame became, in a sense, its own form of architectonic structure.⁸⁷

The practice of easel painting played an important role in the changing practices of painting in the 15th century. Along with the rise of oil-based paint, available and storable in tubes, the painter was freed from not only the wall as a surface to paint on, but also from the studio as the enclosed site for painting. The easel was a perpendicular mount, an upright surface separate from the wall on which to paint an image.⁸⁸ And, as the commerce of oil painting began in the 15th century, paintings would travel from the artist’s easel to the distant wall of the owner.⁸⁹

John Berger invoked a metaphor for the frame of Western European oil painting as it was placed on the wall belonging to its new owner: “It is not so much a framed window open on to the world,” he wrote, “as a safe let into the wall, a safe in which the visible has been deposited.”⁹⁰ The commercial value of the oil painting imbued the edges

of its frame with a new meaning—the frame served as an opening to a virtual vault. Stephen Heath has cited an etymology of the word “frame” which indicates that it was first used in artistic sense is @1600. In this way, Heath targeted a key transition in the history of painting—the beginning of portable easel painting. “Before the 15th century,” Heath wrote, “frames hardly exist, other than as the specific architectural setting that is to be decorated (wall, altarpiece, or whatever); it is during that century that frames begin to have an independent reality....”⁹¹ In this Heath found “a step in the direction of the camera”:

Easel painting....established along with perspective system and camera obscura (the latter itself rapidly becomes a portable apparatus for the mobile painter) is a step in the direction of the camera, a camera that will provide screen and frame and the image reflected, fixed, painted with light: a camera that will culminate this whole vision.⁹²

As we have seen, perspective and the *camera obscura* were widely different representational techniques for painters. But whatever the techniques, whether perspectival or optical, Albertian or Keplerian, “narrative” or “descriptive,” the frame of the painting was a key component of a representational system dependent on the limitations of its frame. This representational system was maintained in the camera’s delimitation of a view. Here, let’s recall an element of perspective underlined by Damisch in *The Origin of Perspective*. Perspective, Damisch wrote, is a “structure of exclusion, the coherence of which is based on a set of refusals.”⁹³ In a relay of frames, the framed view of the camera becomes a framed image seen by an observer.

As we saw in the last chapter, not just the painter but the viewer of perspective was “immobilized by the logic of the system.”⁹⁴ While the viewer’s immobility had a degree of leeway to it, the visual system of easel painting assumed a fixed viewing position: the viewer stands in front of the painting and looks into its frame. Even if paintings like Holbein’s *The Ambassadors* (1533) relied on the subtle shifting of the viewer’s vantage in order to catch its play with anamorphosis, the frame itself suggests a common position for viewing: separate from yet facing it.

The Camera and the Eye of the Viewer: Primary Identification?

The ideological project of “apparatus film theory” read the *cinematic dispositif* as a culmination of a Western philosophical tradition of a transcendental idealist—hence

disembodied—observing subject. In this account, the cinema spectator both takes on the view of the camera and remains outside of the framed view. As Metz wrote, the “eye” of the observer is monocular and in exact identity with the camera’s aperture:

And it is true that as he (*sic*) identifies with himself as look, the spectator can do no other than identify with the camera, too, which has looked before at what he is now looking at and whose stationing (= framing) determines the vanishing point.⁹⁵

In Heath’s account, as in Metz’s, the cinema spectator was positioned in identification with the camera. Heath described how the Quattrocento “system” transforms “scenographic space” (“space set out as spectacle for the eye of the spectator”) to photographic and cinematic space:

The ideal of space remains that of photographic vision which brings with it the concern to sustain **the camera as eye**; in the sense of the **detached untroubled eye... an eye free from the body, outside process, purely looking**. [emphasis added]⁹⁶

Detached and outside: Baudry’s argument also hinged upon the disembodied position of the spectator. Baudry wrote:

If the **eye which moves is no longer fettered by a body**, by the laws of matter and time, if there are no more assignable limits to its displacement—conditions fulfilled by the possibilities of shooting and film—the world will be constituted not only by this eye but for it.⁹⁷ [emphasis added]

Disregarding the implied monocularly of single-point perspective, apparatus theorists isolated two essential elements of cinematic representation: 1) the essential immobility of the spectator in relation to the screen, and 2) the relation of this fixity to the movement of the image on the screen.

Kaja Silverman targeted the premise implicit in these accounts of “primary identification” with the camera—the alignment of the spectator with the camera’s vantage and vision, the “smooth meshing of spectator with ...apparatus.”⁹⁸ The post-1968 French film theorists of “suture” had, according to Silverman, a more disjunctive account of the match between eye and camera, between spectatorial look and the camera. For suture theorists—Oudart, Dayan, Miller—the moment that the spectator becomes aware of the frame, the *jouissance*/pleasure in an image is lost, reduced to an

awareness of the enunciative presence of the apparatus.⁹⁹ The frame serves as the “prick” to the bubble of illusion.

Theorists of suture certainly have a different account of the cinematic text than the apparatus theorists ---its pleasures are contained in its illusion of a *diegesis*; pleasures only to be ruined by the reminders of an enunciative presence. Nevertheless, suture theory contends with the shifts in perspective *between* shots—something that is only tangentially mentioned in Metz, Baudry and Heath. For suture theorists, the shot/reverse shot re-positioning of the spectator places him/her both inside and outside of the spectacle, and “sutures” the spectator into narrative diegetic space. And yet, for suture theorists, the over-arching effect of continuity editing and, in fact of “suture” itself, is to re-stitch the ruptures in the seams of a spatially- and temporally intact *diegesis*, to re-align any fractures in perspective/points of view.

Following the spatial codes of Renaissance perspective, apparatus theorists maintained that the film frame imbricated-- interpellated--the spectator into its philosophical program and ideological consequences. In fact, it was the uniformity of film frame size and its aspect ratio as distinct from the variable sizes of frames in painting, that Heath used to argue as crucial for setting the conditions of spectatorship. The film frame remained, in Heath's account, in the 1.33:1 aspect ratio or was limited to a very few ratios.¹⁰⁰

As a key component of the “basic cinematic apparatus”--consisting of the film, the film projector, the screen and spectator in a fixed relation-- the film **screen** was cast as a conflationary substitute for the film **frame**.¹⁰¹ Apparatus theory may have been dismantled by feminist (and other) correctives to its ahistoric generalizations about spectatorship, its disregard for oppositional strategies of style or exhibition.¹⁰² And yet for apparatus theorists the **screen** was the locus of fascination, the site of enfolding psychic space onto physical space—perhaps more aligned with the Lacanian metaphor of the mirror (and its reflective surface) than with the metaphor of the window (and its transparency.)¹⁰³

The Frame And The Fixed Position of the Viewer

In his 1985 study, *Narration in the Fiction Film*, David Bordwell refuted many of the tenets of apparatus theory's reliance on perspectival positioning.

The motion picture camera is constructed to produce an image by virtue of the central projection of light rays. Many film theorists have taken this to imply that the film image is condemned to repeat the single spatial schema, and thus the “positionality” of Albertian linear perspective. This conclusion is utterly unwarranted.¹⁰⁴

As an example of non-perspectival “positionality,” Bordwell suggested that the *mise en scène* found in “German Expressionist” film belies this fixed position. (His primary example is the false perspective painted on the set design of *The Cabinet of Dr. Caligari* (1919).) Bordwell’s other challenge to perspectival positionality was based on variations in lens length: “Theorists who see the camera as doomed to replicate central perspective tend to wave aside variations in lens length...If lens length has the capacity to create effects of “nonscientific” perspective systems, it does not matter that the camera is built on the Albertian model.”¹⁰⁵

And yet, if Bordwell was a forceful critic of apparatus theory and its reliance on the perspectival frame, his section, “Perspective as Narration,” seems to claim otherwise. In the opening section of *Narration in the Fiction Film*, Bordwell described how “mimetic” theories of narration—story-telling by showing, rather than telling—depend on a perspectival model of vision.¹⁰⁶ Relying primarily on the accounts of perspective rendered by Erwin Panofsky and John White, Bordwell described—in almost exact agreement with apparatus theorists-- how perspective “creates... not only an imaginary scene but a fixed imaginary witness.”¹⁰⁷ Bordwell not only claims that perspective “emerges as a central concept for explaining narration,” he also asserted that perspective is a “central and fully elaborated concept within the mimetic tradition.”¹⁰⁸ Bordwell invoked Alberti’s discussion of *istoria* to illustrate how the “story space’ of perspective maintained a separate space from its viewer. In tracing a history of the *theatron*, the seeing space and sightlines of the theater, Bordwell provided an excellent account of the positioned relation of the viewer to the framed delimitations of the *proscenium* stage. Here Bordwell suggested that the framed story space of the stage was organized according to Albertian principles of perspective. While Bordwell indicted the “positionality” implied in apparatus theory, his account of the position of the theater and cinema spectator seems uncannily in alignment with it.¹⁰⁹ [The distinction between the terms “seeing through” (*perspectiva*) and “seeing in front of” (*prospettiva*) might be important here.¹¹⁰]

THE PERSPECTIVE FRAME and the MOVING IMAGE

Does motion disrupt perspectival fixity? The *camera obscura* produces, as one of its uncanny effects, a moving image distinctly separate from its source—a virtual two-dimensional image that *moves*. The photographic camera could not capture this movement, it could only reproduce a virtual snapshot of it --still time, still space.

The cinematic moving image is produced by a series of “frames” traveling at a precise speed through a fixed aperture of projected light. The film frame may remind us of Alberti’s axioms for perspectival representation. But while the photographic camera’s mechanical capture of objects in depth follows the logic of perspectival positioning and the photographic conventions of depth of field and framing, and hence may support the relation between the filmed image and Renaissance perspective, the cinematic movement of objects within the frame, to its edges, and off-frame, suggests its radical contradiction.¹¹¹

The moving image—with its successive frames linked by various codes of editing—produces multiple perspectives over time. Hence, in the sequential series of frames and in the succession of “shots,” the single-point of perspective is transformed into a series of shifting positions. Indeed, the movement of the image and the mechanics of editing and montage contradict the idea of a consistent positioned “single-point” perspective frame. In this regard, it is necessary to have a taxonomy of the changes in perspective produced 1) by movement within the single frame of single-shot [this can either be movement of objects within a fixed frame or camera movement which makes the edges of the frame movable]; 2) by spatial and temporal shifts between shots in a multiple-shot film [the variation of angle and distance between shots]; and 3) by multiple-frames within a single-shot.¹¹² For the moment, it will be necessary to suspend a stylistic or historically-situated analysis of film form in order to consider the essential multiplicity of spatial and temporal perspective inherent in the cinematic moving image. The moving image provides multiple instances of time *within* each frame as well as a complex temporality *between* frames.

While apparatus theory assessed the perspectival heritage of the fixed frame of the cinematic image, its theorists also had to account for the mobility of the image—movement in a marked contrast to its fixed frame. Baudry acknowledged this problem:

It might thus seem to counter the unifying and "substantializing" character of the single-perspective image, taking what would seem to be instants of time or slices from "reality"... This might permit the supposition, especially since the camera moves, of a multiplicity of points of view which would neutralize the fixed position of the eye-subject and even nullify it. ¹¹³

But equally he denied its effect. In a section of the "Ideological Effects" essay titled "Projection: Difference Denied," Baudry argued that projection effectively effaces the difference between the multiple frames of the film: "The projection operation (projector and screen) restores the continuity of movement and the temporal dimension to the sequence of static images."¹¹⁴ As images are seen sequentially at a speed which produces the illusion of movement (the optics of persistence of vision), the differences between the separate still images is "denied." In his disavowal of the sequential multiplicity of viewpoints, Baudry offered, instead, an explanation that holds the viewpoint and its viewer as fixed. He subordinated the impact of these changes in perspective to the overall "ideological positioning" of the spectator. The single-view point of camera eye is maintained; film lives on the "denial of difference"--all attempts at continuity are attempts to preserve "at any cost the synthetic unity of the locus where meaning originates." ¹¹⁵

Stephen Heath's solution to this issue of shifting perspectives was to argue that narrative (not the film's projection) functions to re-center/re-position the spectator as a chain of shots produces radical perspective shifts between shots. ¹¹⁶ In this argument, the story-telling drives of narrative mask the incoherence of space with the unity of story:

....on the basis of a narrative organization of look and point of view that moves space into place through the image-flow: the character, figure of the look, is a **kind of perspective within the perspective system**, regulating the world, orienting space, providing directions for the spectator. [emphasis added] ¹¹⁷

Here I would suggest, in service of my larger argument, that it is not narrative and not the optics of projection that re-center the spectator, but the frame itself. It is the consistency of the frame that performs the unity of space, not narrative.¹¹⁸ Even in films where shots are geometrically variant, the frame positions the viewer. The frame is equally present in Bruce Conner's *Valse Triste* and Hollis Frampton's *Zorn's Lemma*, in Stan Brakhage's *Mothlight* and Hans Richter's *Rhythmus 21*, in Orson Welles' *Citizen Kane*

and Michelangelo Antonioni's *L'Aventura*, in Georges Melies' *Trip to the Moon* and Edwin S. Porter's *Great Train Robbery*, in George Lucas' *Star Wars* and Stephen Soderbergh's *Schizopolis*.

Heath almost asserted this primacy of the frame when he cited Pierre Francastel's phenomenological account of film movement: "the spectator is not just responsive to what is moving but also to **what stays in place** and the perception of movement supposes **fixed frames**." [emphasis added]¹¹⁹ "*What stays in place*": the frame of the image, the frame of the screen serves as the boundary demarcation between the screen world and the material world of the spectator. Although systems of multiple-frame, multiple-screen representation will be the subject of my final chapter, the overarching convention of moving image technologies-- of cinema and television-- is the containment of the moving image within a frame.

To return for a moment to Heath's suggestion about the role of narrative as a spatial ameliorative, let's examine one of his key claims, that the narrative character, "the figure of the look" is a "kind of *perspective within the perspective system*." (emphasis added)¹²⁰ Perspective, seen as a system which maintains subject position, is described here as a system that also regulates the space of narrative in a mobile and metaphoric manner. Even the shifting "perspectives" of sequential shots can be "orienting" to the spectator, if regulated by a diegetic character.

While not claiming the same figure of "perspective within the perspective system" as Heath, David Bordwell and Kristin Thompson also argued that "techniques of narration" work to produce a unifying effect for the spectator, who despite the shifts in shot-to-shot position, is not unmoored. In her discussion of the development of the continuity system of "Classical Hollywood Cinema," Kristin Thompson argued that the use of editing, composition, and staging combined to provide a unified viewpoint as the action shifts. "The spectator as invisible onlooker at the ideal vantage point," Thompson wrote, "underlies the development of the classical system."¹²¹ Adhering to the principles of Renaissance perspective theory, Thompson also asserted: "The space of the scene both in painting and in the classical film, is organized outward from the spectator's eye." In the continuity system, the 'knot hole in the fence' "is not stationery but moves to the ideal place for viewing."¹²²

I don't want to venture too far afield from the line of my own argument about the cinematic frame as a container for the fractured multiplicity of spatial and temporal

perspectives inherent in the cinematic moving image. Even when shots follow in spatial and temporal “continuity” they are from differently-positioned views. As Rudolph Arnheim pointed out in his defense of the formal specificities which separate film from reality in *Film as Art* (1932): “there are no jerks in time or space.” By contrast, in film time and film space there are “jerks.”¹²³ The spatial and temporal disjunctions of montage produce more radical fractures in this fixed view. (Indeed, André Bazin’s defense of deep focus and the long take was rooted in his emphatic rejection of montage and its “violations” to the “realism” of space and time.¹²⁴)

Cinematic images implicitly have multiple temporal and spatial frames, seen in sequence, *not in simultaneity*. Sequential images fracture the single-point positioning of the image in a single spatial frame. I will return to this issue in the final chapter as I discuss the tenacious hold of single-frame images in the history of filmmaking and the gradual use of (and comfort with) multiple-frame images.¹²⁵

THE FRAME AND THE “AWKWARD BINOCULAR BODY”

“The *camera obscura* with its monocular aperture, became a more perfect terminous for a cone of vision, a more perfect incarnation of a single point than the awkward binocular body of the human subject.”

—Jonathan Crary, *Techniques of the Observer* (1990)

In Jonathan Crary’s account, the *camera obscura* implanted its observer with an “incorporeal”, “apparatically-produced” visuality that ignored the “awkward binocular body,” while 19th century social practices and optical devices like the *phenakistoscope* and the stereoscope produced a new system of visuality, where vision became “corporeal,” located in the “body of the observer.” The broad category of visual experiences and optical devices that rely on light and projected images, visual practices which exist in a continuum from the mid-17th century through to the present, are not easily defined as “corporeal.”

The “cinema,” as we have grown to know it, combined optical trickery with the (disembodied/non -corporeal) projective illusions of the *camera obscura*--the projection of light in a darkened room. I have sustained my critique around this point: the cinema was a device that combined both of these models of vision. Televisual visuality confounds this further. Based less on optically-produced moving images, its light-emanating transmissions--while not relying on projection--certainly command a disembodied non-corporeal mode of viewing.¹²⁶ To illustrate this, I’d like to locate a

different rupture, one that fractures these two models even further and one that holds a significance when viewed from the recent centennial juncture, occurring as it did in the years between 1891 and 1896.

[figure 2-10; *kinetoscope*, Thomas Edison, 1891]

In 1891, Thomas Edison applied for a patent for his *kinetoscope*, an individual peep-show viewer. The *kinetoscope*, it would seem, conforms neatly with Crary's model of a "corporeal" observer. One imagines the body of the viewer draped over these wooden boxes, leaning in to see rolls of film produce motion. The *kinetoscope* box was as much a prosthetic seeing device as the hand-held toys and viewing apparatuses placed against the face and eye. As we know, Edison was not --at first--interested in projection devices, but rather the arcade novelty of the individual viewing machine. It took Edison a few years to perfect his moving picture camera--the *kinetograph*-- and to manufacture enough *kinetoscope* viewing boxes, but by April 1894 the first Kinetoscope parlor opened in New York.¹²⁷ Edison's device proved to be a popular novelty and yet it was the development of systems that **projected** moving images that became the determinative visual practice of the "cinema."

Certainly, as was evident by the anniversaries dramatically celebrated in 1995, the "cinema" has been regarded as being "born" on the dates in 1895 (March 22, the scientific introduction; December 28, the commercial exploitation) when the French *freres* Auguste and Louis Lumière used their invention the Cinématographe to **project** moving images onto a screen.¹²⁸ The switch from the *kinetoscope* viewer to a projection device implied a convergence of "physiological optics" with the "non-corporeal" viewing of the *camera obscura*, and a radical shift in the viewer's position, now seated in front of a screen. The continuous tradition of projected light and illusory images suggests that important aspects of "non-corporeal" visibility remained constant through the cinematic century.

The "cinema" as a public projection device was a form of popular entertainment for a full century, and yet some of its key components--the delimited screen, the reliance on projection display, the photographic basis of its images--have dramatically changed.

Here we need to return to Crary's comments about his own historical vantage. Crary opened *Techniques of the Observer* (1990), with the proclamation: " [we are] in the midst of a transformation in the nature of visibility...more profound than the break that

separates medieval imagery from Renaissance perspective."¹²⁹ Although this assertion elided the profound “break” which is at the core of his study—between the visual systems of the 17th and 18th century from those of the 19th--and located by analogy a break two centuries earlier, Crary suggested that the digital image will “relocate vision” back onto “a place severed from the human observer,” i.e., return us to an apparatically-produced visuality more like the *camera obscura*. Here I agree with Crary, but with the added caveat that there have been visual practices that were apparatically produced and non-corporeal continuously through the 19th and 20th centuries. A key component of the viewer’s position in the cinematic century was to be immobile in front of the frame of the screen. In this century, the “post-cinematic” viewer is ever-more subject to an apparatically-produced visuality, facing a screen.

SPATIALIZED TIME: THE “TIME ARCHITECTURE” OF THE VIRTUAL WINDOW

“They were the first images to effectively rupture the perspectival code that had dominated painting since the Renaissance.... Chronophotography provided a language for representing simultaneity.”

—Marta Braun on Etienne- Jules Marey in *Picturing Time*¹³⁰

The normative still photograph, the snapshot, purports to be an ideal, infinitely thin, wholly static cross-section through a four-dimensional solid, **or tesseract, of unimaginable intricacy.** [emphasis added] -- filmmaker Hollis Frampton¹³¹

The geometric, geophysical delineations of the perspective frame were based on the spatial codes of human vision—the representation of the near and far on the flat plane of representation. In *La Géométrie*—one of the appendices to *Discourse on Method* (1637)--Descartes offered a conceptualization of space as a system of coordinates. “Cartesian space” had a physical dimensionality, its positions could be graphed and measured— x,y,z, for height, width and depth. Perspective, as a rectilinear, geometrically isotopic system fit perfectly into this rationalized model of space. “Linear,” “central,” “single-point,” “focal point” perspective created a spatial logic of depth—arranging the above, below, ahead, behind seen from a viewer’s positioned view.

The photographic camera, relying upon the optical principle of the *camera obscura*, captured its image in the fixed position of monocular perspective. As we have seen in our earlier discussion of “poly-scenic” painting, the single spatial frame of perspectival representation did not always imply a single frame of time. But even as a

mechanical reproduction of the Albertian principles of space, the photograph had an important counter-distinction to the painting: a new potential for preserving a single instant of time. The chemical processes that fixed the image of the *camera obscura* fixed an image of both a single perspectival space and a single moment of time. And, as exposure times became shorter and film speed became faster, the photograph reduced the time of the image to an ever-more fractional instant. Just as the Cartesian model of space held until the physics of relativity unmoored it, perspectival space began to unravel as *time* was introduced as a dimensional element.

Before it was possible to represent movement with moving images, the representation of motion required its reduction to its graphically static form. In the 14th century, mathematician Nicolas Oresme tabulated and graphed intensities in an attempt to represent movement. His method was, at best, a symbolic displacement, a graphic map of how movement operated, but not a mimetic rendition of it. The optical principle of the *camera obscura* made it possible to bring movement onto a surface separate from its origin—and even as its representational essence was flattened to two-dimensions, its motion (of the wind in the trees, for example) remained a key part of the virtual transfer. Photography may have provided a means to record and represent the images of the *camera obscura*, but the resulting image subtracted the liveness, immediacy and movement of the *camera obscura*'s projected image.

In this way the late 19th century “motion studies” conducted by the physiologist Etienne-Jules Marey and by the photographer Eadward Muybridge offer two separate models for how the photographic camera was deployed to record movement. While recent studies have examined these two photographers in sumptuous detail, the differences between their goals and methods provide important distinctions between the use of the single frame image and a more “polyscenic” representation of time.¹³²

[figure 2-11; E.J. Marey, Georges Demeny walking, 1883]

[figure 2-12; Muybridge, from *Human Locomotion*, 1878]

As a physiologist, Etienne-Jules Marey came to photography twenty years into his struggle to record, measure and quantify movement. His earliest attempts to record heart beats (*sphygmograph*, 1860), the movement of muscle (the *Myograph*, 1866), the flight of insects and birds, (1868—harnessed a pigeon to a device which connect wings to a pneumatic drum, recording their movement on a cylinder) involved instruments that were designed to ‘graph’ the movement of living physiology as the sinuous curves of

analog measurement. Marey's book *Animal Mechanism: A Treatise on Terrestrial and Aerial Locomotion*, published in 1874, illustrated the elaborate attachments that he used to tether insects, horses, birds as he struggled to measure their movements.¹³³

[figure 2-13; Marey illustration from *Animal Mechanism: A Treatise on Terrestrial and Aerial Locomotion* (author's collection)]

Marey's machines graphed animal locomotion but could not provide a mimetic rendition of it. It was not until after Marey saw the photographs of Eadward Muybridge (whose volume *Animal Locomotion* was published in 1878) that he turned to photography as a less-encumbering means to record and analyze motion. In 1882, Marey adapted Jules Jansen's photo-revolver (*revolver-photographique*) to "shoot" a bird in flight.¹³⁴ Marey's mechanism (*fusil photographique*) was more than metaphoric; it cannily deployed the exact registration of the gun barrel mechanism to register the phases of a bird in flight. Although the gun-apparatus had distinct advantages over the graphic method of tethering his moving subjects, Marey needed to cut out and arrange its postage-stamp-sized images from its revolving photo-sensitive disc in order to measure the trajectory of the wing's intermittent movement. As a next step, Marey constructed a camera mechanism that reversed the logic of the *fusil photographique*: instead of having the photographic plate revolve exposing light through the shutter of a fixed barrel, it had a fixed plate and a revolving shutter mechanism. As Marta Braun describes:

As the slot—or window, as Marey called it—passed the lens, a phase of the movement was registered on the plate; as the subject moved to a new position, the plate was masked by the shutter; and then as the slot passed the lens again, the subject's new position would be registered on a fresh portion of the plate immediately next to the first, and so on....Marey had created a systematic multiple exposure on a single plate....¹³⁵

Marey continued to make adjustments to his camera set-up—a black background, a mobile camera wagon—all designed to produce sharper multiple images on a single plate. Marey called his procedure time- photography—*chronophotographie*.¹³⁶

By contrast, Eadward Muybridge's endeavors as a photographer and stereographer capturing landscape views of the American west were far from the scientific laboratory experiments of Marey. Yet they became integrally related. As is well known, Muybridge was hired to work for Leland Stanford, the avid horse-enthusiast and governor of California, to settle a bet about the gait of a horse in full trot. Marta Braun

cites a Muybridge letter that indicates that Stanford had access to a copy of Marey's *Animal Mechanism*—which had been published in English in 1874.¹³⁷ In 1878, Muybridge arrayed a battery of cameras with trip-wires to their shutters to photograph successive frames of a horse in motion. The resulting images, when placed side-by-side, formed a sequence that analyzed movement into its constituent single-frame elements.

Hence, Muybridge and Marey chose two quite different modes to represent movement: Marey's chrono-photography recorded movement in a single representation, on a single plate, seen from a single view—a multiple exposure over time.¹³⁸ The resulting image is a composite of layers of time within a single frame. Filmmaking (and now digital) strategies that include layers of superimposition, double exposure, or stop-action substitutions follow this lineage. Contemporary exemplars from the pre-digital composites of Zbig Rybicki to Robert Zemeckis' *Who Framed Roger Rabbit?* to Michel Gondry's digitally-enabled multiply-layered Kylie Minogue all extend from Marey's model of spatially-contained but temporally-fractured moving images.

Muybridge, on the other hand, set his cameras side by side; each camera recorded an isolated movement on a separate discrete frame. As “motion studies,” Muybridge's images, viewed in a series of successive and adjacent frames, were a set of multiples that parsed movement into constituent shots. Muybridge's 1879 *Zoöpraxiscopes* device combined a rotating disc that spun images in rapid succession with a biurnal (two stage) projecting lantern. Spun at the proper speed, the sequence of successive spatially-fractured, temporally-sequential single-frame images gave an illusion of fluid motion.¹³⁹ This apparatus did not—at first—use Muybridge's photographs, but became a key transitional device for producing the illusion of movement, movement now seen in its virtual form. Nevertheless, one key aspect of the transition from Muybridge's still images to their re-animation needs to be underlined here. The analytic insights made visible from the array of images in adjacent synchronic display were lost when the multiples were projected in sequence and in the confines of a single frame. Filmmaking (and now digital) strategies that combine multiple framed images in adjacent display—whether it be split-screens, multiple screens or the overlapping “windows” of computer display—follow this lineage of movement and the frame.

Here too, if the still photograph provided a “tesseract of unimaginable intricacy,” the moving image produces a further exponent of the complicated temporality of the photographic record. In *The Emergence of Cinematic Time: Modernity, Contingency, the*

Archive, Mary Ann Doane has eloquently detailed the paradox essential to the cinematic production of time: movement is produced from frozen instants in separate frames.¹⁴⁰

As the motion studies of Muybridge and Marey proved, the still photograph could see and record what the eye could not.¹⁴¹ And yet, the reconstitution of motion to be reconstituted, its virtual rendition relies on a missing element, a perceptual process that depends on the darkness between the frames. The apparatus of the moving image made this darkness invisible, hiding what the eye might see. The photographic fixing of the image of the *camera obscura* removed its movement; the still image captured a static instant. The analytic insight that is made visible in the “snapshot” or the frozen moment is lost when the frozen moment is returned to motion. As projection commences, the visibility of moving image projection depends on a form of invisibility. Film theorist Thierry Kuntzel has called this invisibility a *défilement* --the spectator sees only the projected movement on the screen, not the hidden frames of film passing through the projector.¹⁴²

The cinematographically-produced moving image could reproduce the perspectival space of the photographic camera and yet, from its first uses, the movement of elements within the frame, the movement of the camera, movement between frames, between shots, challenged the fixed position of the single frame “window” view. The (still or moving) photographic or cinematic image cannot be experienced outside of movement of time (*durée*). The photograph and the moving image are perceived in duration, with an interval between perception and response. Additionally, the mechanical reproduction of moving images allows the exact repetition of these images over time. Casting moving images onto a wall or screen, projection reconstructs the movie camera’s view, but in the camera’s absence. (Lumière’s *Cinématographe* cannily used the same apparatus as both camera and projector.) The separation of these two instances—the time of recording and the time of projection—became the core determinant to the fluid temporalities of cinematic spectatorship. As the time of filming was shifted onto the time of the film’s projection, the cinematic apparatus enacted a *tesseract* as a time machine of inherent delay and playback.¹⁴³ The moving image opened the representational frame to the temporal analog of near and far—the now and then.

As we trace the evolution of challenges to perspectival fixity, the moving image adds a new-- but virtual--mobility to the framed view. Certainly motion and mobility were key terms for early writers about the “kinematics” of the moving image. Vachel Lindsay’s *The Art of the Moving Picture* (1915) contained sections titled Architecture-in-Motion, Painting-in-Motion, Sculpture-in-Motion,¹⁴⁴ Erwin Panofsky’s writing “On Movies”(1936) emphasized the addition of “movement to works of art originally stationary “ and characterized early filmmaking’s “sheer delight in the fact that things seemed to move, no matter what things they were” and the “recording of ‘movement for movement’s sake.’”¹⁴⁵ Although he left these incisive phrases largely unelaborated, Panofsky coined the twin specificities of the “motion picture” as the “dynamization of space” and “spatialization of time.”¹⁴⁶

While the moving image in a single frame retains some of perspective’s fixity, as single frames follow each other sequentially to produce movement, the moving image produces a complex and fractured representation of space and time. And once two or more moving images are included within a single frame—split-screen or multiple-screen films, inset screens on television, multiple windows on the computer screen-- an even more fractured spatio-temporal representational system emerges. What Paul Virilio described as the “battle of geometers”-- those who struggled to map the world into a geographic, geometric, geocentric dimension-- now cedes to a battle of the *temporometers* as we attempt to measure the entirely new temporal dimensions produced by these multiple and virtual mobilities.¹⁴⁷ The “virtual window” is a fixture of this newly-mediated “time architecture.”

¹ Alberti’s knowledge of the *camera obscura* remains a matter of speculation. Biographer Anthony Grafton suggests that Alberti’s demonstrations of the “miracles of painting” may have employed a small box device like the *camera obscura*. See: Anthony Grafton, *Leon Battista Alberti: Master Builder of the Italian Renaissance* (New York: Hill and Wang, 2000). Nevertheless, contemporary accounts have emphasized the conceptual relation between Alberti’s *De Pictura* and the *camera obscura*. Norman Bryson, for example, asserts, the *camera obscura* “provides a conceptual framework for *De Pictura*” and “both Alberti and Vermeer theorize painting around the *camera obscura*.” See

Norman Bryson, *Vision and Painting: The Logic of the Gaze* (New Haven: Yale University Press, 1983): 107, 111.

² For an account of the *camera obscura*'s discursive history, see Jonathan Crary, "The Camera Obscura and Its Subject" in *Techniques of the Observer* (Cambridge, MA: MIT Press, 1990): 30-31. Crary's account is careful to describe the *camera obscura* as a "complex social amalgam" of technical and discursive practices and he carefully situates its discursive and epistemic status in the writings of Descartes, Newton, Locke, Leibniz. See also Crary's earlier essay, "Modernizing Vision," in *Vision and Visuality*, Hal Foster, ed. (Seattle: Bay Press, 1988): 29-44.

For accounts of the *camera obscura* as a drawing tool see: J.H. Hammond, *The Camera Obscura: A Chronicle* (Bristol: Adam Hilger, 1981); Martin Kemp, *The Science of Art :Optical Themes in Western Art from Brunelleschi to Seurat* (New Haven: Yale University Press, 1990); Helmut Gernsheim with A. Gernsheim, *The History of Photography: From the Camera Obscura to the Beginning of the Modern Era* (London: Thames and Hudson, 1955); Arthur K. Wheelock, *Perspective, Optics, and Delft Artists Around 1650* (New York: Garland, 1977); also: Janice L. Neri, "Camera obscura," in *The Dictionary of Early Modern Europe*, ed. Jonathan Dewald (New York: Scribners, forthcoming).

For the role of *camera obscura* in relation to the history of projected light and shadow, see Laurent Mannoni, *The Great Art of Light and Shadow: Archeology of the Cinema*, translated by Richard Crangle (Exeter: University of Exeter Press, 2000).

³ Alberti, *De Pictura*, 69.

⁴ The *camera obscura* produced number of paradoxical transformations of inside and outside. Kim H. Veltman suggests that the *camera obscura*, although theoretically suited for making representations of both exterior and interior spaces, was, in practice, more often used for the painting of interiors. Veltman also suggests that the tradition of ceiling painting that became known as *quadratura* "interiorized" the central atrium-like courtyard of Renaissance home and functioned as a window into the sky above by painting views on closed ceilings. Kim H. Veltman, *Linear Perspective and the Visual Dimensions of Science and Art; Studies on Leonardo da Vinci I* (München: Deutscher Kunstverlag, 1986). When *camera obscuras* were large enough to be full-sized rooms or tents, the architectural function of its tiny window opening was only for admitting focused light. The aperture reduced the window's function for "ventilation" to metaphor.

⁵ The term "natural magic" is taken from Giambattista della Porta's 1558 text, *Magiae naturalis*. Della Porta's 1589 Latin text was translated and published in an English-language edition, *Natural Magick in Twenty Books*, in London in 1658. The chapters include: on changing metals, counterfeiting gold, perfuming, production of new plants, strange cures, beautifying women, invisible writing. Book 17 on "strange glasses" contains the discussion of "catoptrick" glasses and the "wonderful sights to be seen by them." For a discussion of the role of optics in the "natural sciences" see Thomas L. Hankins and Robert J. Silverman, "Instruments and Images: Subjects for the Historiography of Science," in *Instruments and the Imagination* (Princeton: Princeton University Press, 1995): 3-14; Barbara Maria Stafford, "Revealing Technologies/Magical Domains," in Barbara Maria Stafford and Fran Terpak, *Devices of Wonder: From the World in a Box to Images on the Screen* (Los Angeles: Getty Research Institute, 2001): 1-

142; Laurent Mannoni, *The Great Art of Light and Shadow: Archeology of the Cinema*, translated by Richard Crangle (Exeter: University of Exeter Press, 2000).

⁶ Richter, ed., *Selections from the Notebooks of Leonardo da Vinci* (Oxford: Oxford University Press, 1977): 115-116. In optical terms, the problem of inversion was not solved until Kepler (1604) described his theory of the retinal image. See: David C. Lindberg, *Theories of Vision from Al-Kindi to Kepler* (Chicago: University of Chicago Press, 1976). Leonardo compared the eye to the *camera obscura* but, according to Lindberg he never asserted that the retina function as a screen onto which images are projected. (Lindberg, 164) Lindberg describes the magnitude of Kepler's achievement in terms of his innovation of a theory of the retinal image and asserts that Kepler was the first to use the term *pictura* to refer to the inverted image on the retina:

For this is the first genuine instance in the history of visual theory of a real optical image within the eye—a picture, having an existence independent of the observer, formed by the focusing of all available rays on a surface. (Lindberg, 202)

While Kepler's description of "radiation through apertures" and his punctiform analysis of rays of vision were based upon medieval perspectivists and he did not, at first, depart from their accounts of the geometry of vision, in order to account for the inversion of the image, Kepler needed to investigate and understand lenses and their refraction. The correction of the image's inversion came later and was performed by the use of mirrors. The *camera lucida*—a much later drawing device—is quite different from the *camera obscura*. While the name *camera lucida* may suggest a relation to the *camera obscura*, it does not involve a chamber (*camera*) at all but is instead a glass prism on a stand which refracts light to a perpendicular surface where the artist can trace the image.

⁷ Johannes Kepler, *Ad Vitellionem Paralipomena* (Frankfurt, 1604) and Kepler, *Dioptrice* (Augsburg, 1611): 16. Many historical accounts describe the use of the "*camera obscura*" in earlier epochs and, while the optical properties of projective light had been known, the name of the device was not yet coined. See: Paula Findlen, ed. *Athanasius Kircher: The Last Man Who Knew Everything* (New York: Routledge, 2004); David C. Lindberg, *Theories of Vision From Al-Kindi to Kepler* (Chicago: University of Chicago Press, 1976).

⁸ "Therefore vision occurs through a picture of the visible thing [being formed] on the white, concave surface of the retina. And that which is to the right on the outside is portrayed on the left side of the retina; that which is to the left is portrayed on the right; that which is above is portrayed below; that which is below is portrayed above...." *Ad Vitellionem Paralipomena* (1604) quoted in Lindberg, *Theories of Vision*, p. 200. Kepler (1604) had no drawing to illustrate his retinal theory; Descartes supplied an illustration of the retinal inversion in his *La dioptrique* (1637).

⁹ Italian Girolamo Cardano may have been the first to introduce lenses in 1550: "If you care to see what goes on in the street when the sun is bright, place in your windows a glass disc and the window having been closed [shuttered] you will see images projected through the aperture onto the wall...." From G Potonniée, *The History of the Discovery of Photography* trans. E Epstein (New York: Tennant and Ward, 1936): 14. Otherwise, it is generally agreed that Della Porta (in his 1589 edition) suggested the use of a lens in the opening to improve the quality of the projected image. Giovanni Battista della Porta,

Natural Magick (reprint New York 1957): 363-364. First English Edition 1658 of Porta's *Magiae naturalis*, first published in four books in 1558, and then in an expanded twenty-book version in 1589.

¹⁰ Descartes, "Dioptrics: Discourse V," in Rene Descartes, *Philosophical Writings*, translated and edited by Elizabeth Anscombe and Peter Thomas Geach (London: Nelson and Sons, 1954): 245. In *Magiae naturalis* (1558, 1589) Della Porta popularized the *camera obscura* as an entertainment device. In his work on optics, *De refractione* (1593), he suggested the eye was a miniature *camera obscura*. See David C. Lindberg, *Theories of Vision From Al-Kindi to Kepler* (Chicago: University of Chicago Press, 1976): 182-184.

¹¹ For an excellent account of the use of optical devices in scientific illustration see Janice L. Neri, "Fantastic Observations: Images of Insects in Early Modern Europe," (PhD. dissertation in Visual Studies, University of California, Irvine, 2003.) Neri demonstrates how, despite Robert Hooke's claim in his preface to *Micrographia* that it took: "a sincere hand, and a faithful eye, to examine and to record the things themselves as they appear," that he also relied on a variety of pictorial strategies to carefully craft both the specimen and the image.

¹² See Barbara Maria Stafford, "Magnifying," in *Body Criticism: Imaging the Unseen in Enlightenment Art and Medicine* (Cambridge, MA: MIT Press, 1993). While Dutch lensmakers Hans Lippershey and Hans Jansen had versions of a device—using convex and concave lenses in a tube in 1609, it was Galileo who made the device famous. After the publication of his 1632 book, *Dialogue Concerning the Two Chief World Systems, Ptolemaic and Copernican*, Galileo was called to Rome, found guilty of heresy, and put under house arrest for the remainder of his life. For sources on the history of the telescope—its combination of lenses, astronomical and terrestrial uses, its field of magnification, see Henry King, *The History of the Telescope* (London: Griffin, 1955) and Albert van Helden, *The Invention of the Telescope*, in *Transactions of the American Philosophical Society*, 67, no. 4 (1977). In Max Horkheimer's skeptical reading, these dioptric devices did not enhance vision but were blinding: "As their telescopes and microscopes, their tapes and radios become more sensitive, individuals become blinder, more hard of hearing, less responsive." Max Horkheimer, *Dawn and Decline* (New York: Seabury Press, 1978).

¹³ *Technics and Civilization* (New York: Harcourt, Brace and Company, 1934): this quote serves as a caption to an illustration plate between 180-181.

¹⁴ *Technics and Civilization* (New York: Harcourt, Brace and Company, 1934): 131.

¹⁵ See the discussion "Microscopes," in *Devices of Wonder*, 205-214. Microscopes were used in upper-class drawing rooms, museums and, in this way, were part of a visual culture which prized exhibition and display. The stereoscope and the *camera obscura* were also used as entertainment as much in the drawing room as in the laboratory. For an illustrative compendium of such devices see Barbara Stafford and Fran Terpak, *Devices of Wonder: From the World in a Box to Images on the Screen* (Los Angeles: Getty Research Institute, 2001).

¹⁶ See: J.H. Hammond, *The Camera Obscura: A Chronicle* (Bristol: Adam Hilger, 1981); Martin Kemp, *The Science of Art: Optical Themes in Western Art from Brunelleschi to Seurat* (New Haven: Yale University Press, 1990); Helmut Gernsheim with A.

Gernsheim, *The History of Photography: From the Camera Obscura to the Beginning of the Modern Era* (London: Thames and Hudson, 1955); Arthur K. Wheelock, *Perspective, Optics, and Delft Artists Around 1650* (New York: Garland, 1977). In his book, *The Great Art of Light and Shadow: Archeology of the Cinema* Laurent Manonni challenges many "erroneous attributions" in the histories written about the *camera obscura* and magic lantern tradition. He pointedly objects to historians who erroneously attribute its invention to the sixteenth-century Italian scientist Giovanni Battista della Porta (1540-1615). In fact, della Porta merely published a description of it, in a four-part book entitled *Magiae Naturalis* ('Natural Magic') printed in Naples in 1558. The mistaken paternity is found repeated in supposedly authoritative works, such as the *Leçons de Physique* of Abbé Nollet (1743) and the *Encyclopédie* of Diderot and d'Alembert (1753), among other sources. Laurent Mannoni, *The Great Art of Light and Shadow: Archeology of the Cinema* (Exeter: University of Exeter Press, 2000):8. Kepler uses window to describe *camera obscura* opening:

When a screen with a small window is placed in front of the globe within the limit of the sections of the parallels, and the window is smaller than the globe, a picture of the visible hemisphere is projected on to the paper, formed by most of the rays brought together behind the globe at the limit of the last intersection of the rays from a luminous point. The picture is inverted, but purest and most distinct in the middle.

Johannes Kepler, "On Vision/ *De Modo Visionis*" - Chapter V. Proposition Xxiii Translation of A.C. Crombie (Modified from the Latin by R.A. Hatch)[CITATION NEEDED]

¹⁷ In January 2000, Lawrence Wechsler published an article in *The New Yorker* which described David Hockney's theory about the use of lenses by the "Old Masters." In December 2001, The New York Institute for the Humanities held a public symposium, "Art and Optics: Toward an Evaluation of David Hockney's New Theories Regarding Opticality in Western Painting of the Past 600 Years." See: Lawrence Wechsler, "The Looking Glass," *The New Yorker*, January 31, 2000; Mel Gussow, "Old Masters Pursued by Artistic Gumshoes: Debating Whether Artists Used Optics," *The New York Times*, November 29, 2001: E1, E4; Sarah Boxer, "Paintings a Bit Too Perfect? The Great Optics Debate," *The New York Times*, December 4, 2001: E1, E4.

¹⁸For accounts of Vermeer's use of the *camera obscura* see: Charles, Seymour, Jr. "Dark Chamber and Light-Filled Room: Vermeer and the Camera Obscura," *Art Bulletin* 46, (1964), 323-331; Daniel A. Fink, "Vermeer's Use of the Camera Obscura: A Comparative Study," *Art Bulletin* 53 (1971): 493-505; Arthur K. Wheelock, *Perspective, Optics, and Delft Artists Around 1650* (New York: Garland, 1977); Philip Steadman, *Vermeer's Camera: Uncovering the Truth Behind the Masterpieces* (London: Oxford University Press, 2001). Svetlana Alpers, is less insistent on the use of the *camera obscura* to the techniques of Dutch painting, Svetlana Alpers, *The Art of Describing: Dutch Art in the Seventeenth Century* (Chicago: University of Chicago Press, 1983):13. As Crary points out about the Vermeer debate, the art historical interest in the *camera obscura* has been in terms of its effects on the stylistics of painting, and not on techniques of observation.

¹⁹ Steadman, *Vermeer's Camera*, 155.

²⁰ See David Hockney, *The Secret Knowledge: Rediscovering the Lost Techniques of the Old Masters* (New York: Viking Press, 2001). In formal terms, Hockney's method of research and argumentation was based on his collage construction of a "Great Wall" of painting, a comparative array of historical representation. If considered in overall form, this collage of art history bears a resemblance to Hockney's own collage forms. See my footnote 59 in Chapter One.

²¹ Hockney argues that Holbein could have used Dürer's drawing device for the lute seen on the bottom shelf but that the other curved objects in the painting—the curtains, the globe, the musical score, and most emphatically, the musical score—suggest the use of optical tools. David Hockney, *The Secret Knowledge: Rediscovering the Lost Techniques of the Old Masters* (New York: Viking Press, 2001); 56-57, 100. Martin Kemp's lecture, "Painting with Light or with Geometry: Looking into David Hockney's Secret Knowledge," questioned the "cliché" of split between the use of light (by Southern/Italian painters) and the use of optics (by Northern/Dutch painters). [Lecture, May 3, 2002, Getty Research Institute.]

²² Svetlana Alpers, *The Art of Describing*, 31. Alpers writes:

The problem is that although many sixteenth and seventeenth-century treatises that discuss the artistic use of the camera obscura recommend tracing its image, we have no evidence of cases in which artists actually did this. The argument from use, rather than from analogy, has had to proceed therefore by trying to establish specific phenomena present in paintings that are not seen by unaided vision and that, it is concluded, must result from the use of the camera obscura.

Svetlana Alpers, *The Art of Describing: Dutch Art in the Seventeenth Century* (Chicago: University of Chicago Press, 1983):30.

²³ Alpers, 27. Alpers characterizes the geographically defined styles as "visual culture" citing Michael Baxandall, *Painting and Experience in Fifteenth Century Italy: A Primer in the Social History of Pictorial Style* (Oxford, 1972).

²⁴ Svetlana Alpers, *The Art of Describing*, 51.

²⁵ Svetlana Alpers, *The Art of Describing*, 138. Alpers argues that Dutch paintings do not adhere to the Albertian concept of a picture as "a framed surface or pane situated at a distance from a viewer who looks through it at a substitute world."

²⁶ Svetlana Alpers, *The Art of Describing* 51, 32.

²⁷ "It is less the nature or use made of the camera obscura," Alpers writes, "than the trust placed in it that is of interest to us in understanding Dutch painting." Svetlana Alpers, *The Art of Describing*, 33.

²⁸ Svetlana Alpers, *The Art of Describing*, xxv.

²⁹ Svetlana Alpers, *The Art of Describing*, 26, 32.

³⁰ In this regard, Jonathan Crary astutely points out that Kepler may not be representative of only Northern visual culture and that the *camera obscura* held a trans-regional importance in the writings of Leibniz, Newton, Locke and Descartes. See Crary, *Techniques of the Observer*, 35.

³¹ Samuel Van Hoogstraten's perspective box (c. 1660) establishes a fixed viewpoint for viewer who must look into the deep space of the box with one eye.

From at least the time of Alberti there had been adaptations of the *camera obscura* principle to create miniature rooms. The seventeenth century brought

new portable versions of the *camera obscura*, as well as developments by Dutch artists to create peep shows (the *perspectifkas*) into perspectival rooms and interiors. The eighteenth century extended this idea to create optical glasses (*optiques* or *zograscopes*) and show-boxes (*Guckkasten*) the latter sometimes with moving images. (80-84).

Kim H. Veltman, *Linear Perspective and the Visual Dimensions of Science and Art, Studies on Leonardo da Vinci I* (München: Deutscher Kunstverlag, 1986).

Alpers mentions Hoogstraten's peep-box as "an unframed sequence of rooms or vistas successively viewed," "which provides the viewer with an eye-hole through which to look at an interior illusionistically depicted on the inner surfaces of the box." *The Art of Describing*, 62,35.

³² Svetlana Alpers, *The Art of Describing: Dutch Art in the Seventeenth Century* (Chicago: University of Chicago Press, 1983): 13.

³³ Crary, *Techniques of the Observer*, 34.

³⁴ Crary, *Techniques of the Observer*, 39. Crary uses the Kircher illustration on the same page.

³⁵ John Baptist Porta, *Natural Magick in Twenty Books* (London, 1658): 364. [manuscript in special collections, J. Paul Getty library]

³⁶ Johannes Zahn *Oculus Artificialis Teledioptricus sive Telescopium* was principally devoted to the telescope, but as its illustrations attest, it also contained discussions of the magic lantern as a projection device and the *camera obscura* as a drawing device.

³⁷ Crary, *Techniques of the Observer*, 5. The "history of the observer is not reducible to changing technical and mechanical practices any more than to the changing forms of artworks and visual representation." (3?)

³⁸ Crary, *Techniques of the Observer*, 3. The importance of Crary's insight is twofold: First, Crary's study conducts an important methodological shift from the traditional art historical analysis of the art object to the practices and habits of vision of an "observing subject." Second, Crary productively questions the oversights produced in the familiar and reductive teleologies that form the core narratives of modernism and of photography. Both of these elements have turned his work into a central and admirable example of a "visual studies" methodology.

³⁹ Crary challenges the core narrative of modernism—that the classical strictures of painting were in place until late in the 19th century when, in the 1870s/1880s, impressionist painters broke with perspectival models of vision and ruptured classical space and mimetic codes which had been in place since the Renaissance. More importantly, here however, is Crary's challenge to the core narrative of photography—that it represented a continuous tradition of realist strictures which also had been in place since the Renaissance. Crary argues for an earlier moment of rupture—in the 1820s and 1830s, before the invention of photography and before the stylistics of Impressionism and Cubism.

⁴⁰ See W.J.T. Mitchell's incisive critique of Crary's "failing to heed many of his own warnings about overgeneralization and categorical truth claims" in "The Pictorial Turn," *Artforum*, Volume 30, #7 (March 1992): 89-94. Architectural historians Alberto Pérez-Gómez and Louise Pelletier also find Crary's Foucauldian-derived rupture problematic.

They argue that Crary overstates the importance of the camera obscura in the seventeenth and eighteenth centuries without discussing its precedents in *perspectiva naturalis*. Though many indeed were fascinated by the *camera obscura* because of its capacity to represent a resonant, magical image, its application in the arts is a highly speculative question about which there is little factual evidence.

Crary's study can be seen, in fact, as a radical antithesis to the "progressive" history of optics and painting that is the premise of Martin Kemp's *Science of Art*. Both of these recent works on problems of representation in the European tradition take extreme positions that appear very problematic. Such complex questions, with great repercussions for our own artistic and architectural practice, demand a different kind of thinking and cannot be reduced to either a simplistic progressive continuity or a radical historicity. In our opinion, the epistemological discontinuities of vision must be acknowledged without disregarding a continuity in the history of European science and philosophy.

See: Alberto Pérez-Gómez and Louise Pelletier. *Architectural Representation and the Perspective Hinge* (Cambridge, MA; MIT Press, 1997): 67-68.

⁴¹ *Techniques of the Observer*, 27. Crary posits a radical rupture in genealogies that trace a continuous Western visual and philosophical tradition of an ideal, centered "observer" from Renaissance perspective onward to the birth of photography and the cinema. Crary's argument posits two broad and opposing *epistemes*, two very separate models of vision with two very different "observers." In the 17th and 18th century, Crary locates the "camera obscura model of vision" as the "dominant" paradigm for "explaining human vision, and for representing the relation of a perceiver and the position of a knowing subject to an external world." The "observer" in the 17th/18th century was, in Crary's account, at a distance from the object of vision. In this model, vision was separate, outside of the body, "incorporeal." In the 19th century, a "sweeping transformation" of social practices and optical devices produced a fundamental change to this "apparatically-produced" model of vision. In the 1820s and 1830s, as optical researchers studied human vision and produced optical devices that demonstrated the "physiological optics" of binocular parallax and persistence of vision, the "observer" was retooled, Crary asserts, as an active producer of optical experience. In the rush to fit optical devices into the *epistemes* of tidily contained centuries (the disembodied "camera obscura" of the 17th/18th centuries vs. "physiological optics" of the 19th), Crary elides the differences between 19th century devices that rely on binocular parallax—like the stereoscope-- and those relying on persistence of vision—like the *phenakistiscope*—devices which produce quite different optical and hence subjective effects. Devices like the stereoscope and the *phenakistiscope* demonstrated these new optical principles; the visual effects produced by these devices occurred in the "body" of the observer. In Crary's account of this new regime of vision, the observer had a new "carnal density" and "corporeality." Although Crary terms this a "physiological optics," and emphasizes the bodily-produced sensations, he does not account for the body's position in relation to the eye--the relation of sight to bodily movement-- or for the optical and hence subjective differences between binocular parallax and persistence of vision. Crary's account of the "body of the observer" is not an account of a social-constituted or gendered body.

⁴² Crary, *Techniques of the Observer*, 33. Crary's dismissal seems odd because he supplies more evidence for its use as a device of illusion than as a drawing device.

⁴³ Two recent books have elaborated this history: Laurent Mannoni, *The Great Art of Light and Shadow: Archeology of Cinema*, translated by Richard Crangle (Exeter: University of Exeter Press, 2000); Deac Rossell, *Living Pictures: The Origins of the Movies* (Albany: State University of New York Press, 1998). Mannoni's book was first published in French in 1994: *Le grand art de la lumière et de l'ombre: Archéologie du cinéma* (Paris: Editions Nathan, 1994).

⁴⁴ See: Martin Quigley, Jr. *Magic Shadows: The Story of the Origin of Motion Pictures* (New York, 1960), Olive Cook, *Movement in Two Dimensions* (London: Hutchinson & Co, 1963); C.W. *Archeology of the Cinema* (New York: Harcourt, Brace & World, Inc.); Charles Musser, "Toward a History of Screen Practice," in *The Emergence of Cinema: The American Screen to 1907* (New York: Charles Scribner's Sons, 1990): 15-54; Jac Remise, Pascale Remise, Regis Van de Walle, *Magic Lumineuse: du théâtre d'ombres à la lanterne magique* (Paris: Balland, 1979); H. Mark Gosser, "Kircher and Lanterna Jaga—A Re-Examination," *Journal of the Society of Motion Picture and Television Engineers* 90, October 1981: 972-978.

⁴⁵ Musser traces the roots of cinema in forms of "screen practice" that relied on darkened rooms and projected light. Charles Musser, "Toward a History of Screen Practice," in *The Emergence of Cinema: The American Screen to 1907* (New York: Charles Scribner's Sons, 1990): 15-54.

⁴⁶ Laurent Mannoni, *The Great Art of Light and Shadow: Archeology of Cinema*, translated by Richard Crangle (Exeter: University of Exeter Press, 2000); Deac Rossell, *Living Pictures: The Origins of the Movies* (Albany: State University of New York Press, 1998). Mannoni's book was first published in French in 1994: *Le grand art de la lumière et de l'ombre: Archéologie du cinéma* (Paris: Editions Nathan, 1994).

⁴⁷ In Mannoni's corrective account of the "magic lantern," German Jesuit Athanasius Kircher was "its pseudo-inventor" and Dutch Protestant Christiaan Huygens "its true father" (34). Kircher's 1646 edition of *Ars Magna Lucis et Umbrae* claimed many inventions. Mannoni writes: "...some of the most serious historians have been deceived into believing (some still to this day) that this was the invention of the magic lantern." (23) The "magic lantern," Mannoni claims, was properly invented in 1659 by Christiaan Huygens and properly named in 1668 by Italian mathematician Francesco Eschinardi. See Mannoni, *The Great Art of Light and Shadow*, pp. 3-73.

⁴⁸ The discovery of chemicals to fix the camera's image made it possible to retain the writing of light on a surface; to *photo-graph*. Once light writes its image on a surface, the image out its window—its tiny aperture—is fixed as its two-dimensional virtual other. The flight of birds, the movement of trees in the wind, the gestures of humans were of great fascination to the viewers of the *camera obscura*, but the photograph could not record the movement in two dimensions. In order to reconstitute movement, a different apparatus with different mechanics needed to be developed: movement had to be recorded onto separate frames on a strip of light-sensitive film, and the strip of separate images had to be moved quickly past a light source. See Olive Cook, *Movement in Two Dimensions* (London: Hutchinson & Co., 1963). The size of the image was dependent on its distance from the aperture. But the shape of the projected image, as noted by commentators as

early as Aristotle, was always circular. Roger Bacon tried a square aperture but the image was still circular, leading him to conclude that it was a property of light.

⁴⁹ Laurent Mannoni, *The Great Art of Light and Shadow: Archeology of Cinema*, translated by Richard Crangle (Exeter: University of Exeter Press, 2000): 264.

⁵⁰ The recent facsimile reprint of a two-volume set of 19th century pre-cinematic documents provides many texts and treatises as evidence of the vibrancy of the practice in the late 19th century. Stephen Herbert, *A History of Pre-Cinema*, in three volumes (New York: Routledge, 2000) includes W.J. Chadwick, *The Magic Lantern Manual* (London: Frederick Warne and Co., 1878).

⁵¹ Karl Marx and Fredrick Engels, *The German Ideology* edited by C.J. Arthur (New York: International Publishers, 1970): 47.

⁵² For an exegesis of the *camera obscura* and other figurative language in Marx, see W.J.T. Mitchell, "Rhetoric of Iconoclasm: Marxism, Ideology, and Fetishism," in *Iconology: Image, Text Ideology* (Chicago: University of Chicago Press, 1986); Raymond Williams "From Reflection to Mediation" in *Marxism and Literature* (Oxford: Oxford University Press, 1977); Sarah Kofman, *Camera Obscura de l'Ideologie* (Paris: Editions Galilee, 1983). Marx also invoked another optical device, the *phantasmagoria* to decry capitalism's realm of illusion. The editors of the feminist film journal *Camera Obscura* launched their first issue with an editorial that adopted the metaphor as a convergence of ideology and representation. Editorial, "Feminism and Film: Critical Approaches," *Camera Obscura* 1 (Fall 1976): 3-10.

⁵³ Karl Marx and Fredrick Engels, *The German Ideology* edited by C.J. Arthur (New York: International Publishers, 1970): 47.

⁵⁴ Roland Barthes, *Camera Lucida*, p. 80. This point is also made by Jean Louis Comolli in an 1978 essay, "Machines of the Visible." In a critique of a French theorist, J.P. Lebel, for his concern with the ideological/scientific "regulation" of cinema equated with geometral optics, Comolli writes: "he simply forgets the other patron science of cinema and photography, photochemistry, without which the camera would be no more precisely than a *camera obscura*." See: Jean Louis Comolli, "Machines of the Visible," Teresa in De Lauretis and Stephen Heath, editors, *The Cinematic Apparatus* (New York: St. Martin's Press, 1980): 125.

⁵⁵ André Bazin, "The Ontology of the Photographic Image," in *What Is Cinema? Volume I*, trans. Hugh Gray (Berkeley: University of California Press, 1967):11.

⁵⁶ Quoted in Beaumont Newhall, *The History of Photography* (New York: Museum of Modern Art, 1964): 13. Quoted from V. Fouque, *La Verité sur l'invention de la photographie; Nicéphore Niépce* (Paris, 1867): 61. Niépce's view from his window at Gras is often thought to be the earliest known existing photograph. As a millennial gesture in 2000, Magnum photographer René Burri returned to Niépce's attic window and retook photograph which was then published in *Life* magazine. [In much the same manner, that the 1995 film *Lumiere & Co.* had contemporary filmmakers use the Lumiere's 1895 *Cinématographe* to make short "actualities" one hundred years later.]

⁵⁷ The "first photograph" is currently housed in its original presentational frame but encased with inert gas in an airtight steel and plexiglass storage frame at the University of Texas in Austin. Photo historian Helmut Gernsheim obtained the photograph for his own collection in the 1950s and then donated the piece to UT in 1963. In 1952, Gernsheim

attempted to photograph the heliographic image for a copy-print. The image of the original heliograph that is commonly reproduced was made in 1952 at the Eastman Kodak Research Laboratory in Harrow, England.

⁵⁸ Beaumont Newhall's *The History of Photography* (New York: Museum of Modern Art, 1964): 11 commences with the opening assertion: "Camera pictures have been made since the Renaissance." See also: Helmut Gernsheim with A. Gernsheim, *The History of Photography: From the Camera Obscura to the Beginning of the Modern Era* (London: Thames and Hudson, 1955).

⁵⁹ André Bazin, "The Myth of Total Cinema," *What is Cinema? Volume 1*, translated by Hugh Gray (Berkeley: University of California Press, 1971): 20-21. Although both of these early essays share the assumption of a teleological impulse toward realism, the later essay is largely concerned with the technical delays in achieving the ideal of "total cinema." I would argue, counter to Bazin, that it was the fascination with *virtuality*—the near approximation of the real—and not with the reality of images that has driven these inventions. In his writing on animation, Alan Cholodenko argues that the fascination for spectators was with "*the illusion of life*...the way in which an apparatus animates—gives movement and life to—images of peoples and things." Cholodenko emphasizes that cinema was first an "animatic apparatus" and that all forms of cinema descend from it. See: Alan Cholodenko, ed. *The Illusion of Life: Essays on Animation* (Bloomington, Indiana: Indiana University Press, 1993): 20.

⁶⁰ Bazin, "Ontology of the Photographic Image," *What is Cinema? Volume 1*, 11-13.

⁶¹ "Painting was forced, as it turned out, to offer us illusion, and this illusion was reckoned sufficient unto art. Photography and cinema, on the other hand are discoveries that satisfy once and for all and in its very essence, our obsession with realism." André Bazin, "The Ontology of the Photographic Image," in *What is Cinema? Volume 1*, translated by Hugh Gray (Berkeley: University of California Press, 1971): 15.

Here it is necessary to ground Bazin's commitment to a realist ontology in relation to his post-WWII indictment of the anti-realist film aesthetics of the Soviet montagists and the German Expressionists. Bazin's argument holds the Soviets and Germans—wartime enemies of the French and their Allies—as implicit rhetorical villains. In "The Evolution of the Language of the Cinema," a composite of essays written between 1950-1955, Bazin's position shifted slightly from his early claims for the "integral" ontological realism of the photographic image to a more specifically stylistic realism of the long-take, deep-focus style. In this essay, Bazin attacks the montage-style of the Soviets Kuleshov and Eisenstein ("they did not give us the event, they alluded to it") and the *mise-en-scene* of the German school (which "did every kind of violence to the plastics of the image by way of sets and lighting.") See *What Is Cinema?, Volume 1*, trans. Hugh Gray (Berkeley: University of California Press, 1967):25-26. For a discussion of Bazin's war and post-war politics, his rejection of Stalinism of the Communist party, see Dudley Andrew, *André Bazin* (New York: Columbia University Press, 1978). Andrew also offers biographical account of the influence of Henri Bergson, Malraux and Sartre on Bazin.

⁶² "Apparatus": Collections of key essays from "apparatus" theory--the writings of Jean-Louis Baudry, Jean-Louis Comolli, Stephen Heath and Christian Metz-- have been anthologized in translation in three anthologies: *The Cinematic Apparatus*. Ed. Teresa De

Lauretis and Steven Health (New York: St. Martin Press, 1980); *Narrative, Apparatus, Ideology*, edited by Phil Rosen (New York: Columbia University Press, 1986); *Apparatus*, edited by Theresa Hak Kyung Cha (New York: Tanam Press, 1980).

Phil Rosen's book, *Change Mummified: Cinema, Historicity, Theory* (Minneapolis: University of Minnesota Press, 2001) examines the continental and Anglo-American rejection of Bazin in 1970s film theory. Rosen finds the spatial realism of perspective to be of less importance to Bazin than issues of temporality. Rosen takes the quote from Bazin's "Ontology" essay: "For the first time, the image of things is likewise the image of their duration, change mummified as it were." (Bazin, "The Ontology of the Photographic Image," 15) as the signal statement about the cinema's capacities in the "defense against the passage of time." [see Rosen, *Change Mummified* pp. 3-41.]

⁶³ "Apparatus" has been used as the translation for the French word *dispositif*—a device or arrangement which includes its metaphysical and meta-psychological effects. The translation "apparatus" elides the distinction between the *dispositif* as arrangement and the *appareil* as machine. Although Althusser is usually credited for the derivation of the term "dispositif" for film theory, Joan Copjec asserts that apparatus theory borrowed the term "dispositif" from Bachelard not Althusser. See Joan Copjec, *Read My Desire: Lacan against the Historicists* (Cambridge: MIT Press, 1997); See also: Etienne Balibar, "From Bachelard to Althusser: the concept of 'epistemological break'," in *Economy and Society* 5, no.4 (November 1976): 385-411.

⁶⁴ Jean Louis Baudry, "Ideological Effects of the Basic Cinematographic Apparatus," translated by Alan Williams in *Narrative, Apparatus, Ideology*, edited by Phil Rosen (New York: Columbia University Press, 1986): 286. Baudry's two essays, "Ideological Effects of the Basic Cinematographic Apparatus," (1970) and "The Apparatus: Metapsychological Approaches to the Impression of Reality in the Cinema" (1975) offer an ideological critique of the "reality effect" of cinematic spectatorship. The earlier essay is more directly influenced by a post-May '68 critique of the ideology of representation; the second essay is more fully in the force-field of psychoanalytic theory. ["Ideological Effects" was first printed in *Cinetheque* Nos 7-8 (1970); "The Apparatus" was first printed in *Communications*, no. 23 (1975): 56-73. Both have been reprinted in translation in *Apparatus*, edited by Theresa Hak Kyung Cha (New York: Tanam Press, 1980) and in *Narrative, Apparatus, Ideology*, edited by Phil Rosen (New York: Columbia University Press, 1986).]

⁶⁵ Baudry, "Ideological Effects of the Basic Cinematographic Apparatus," in *Narrative, Apparatus, Ideology*, 288.

⁶⁶ Baudry, "Ideological Effects of the Basic Cinematographic Apparatus," in *Narrative, Apparatus, Ideology*, 288-299.

⁶⁷ Cited previously in f.48: Karl Marx and Fredrick Engels, *The German Ideology* edited by C.J. Arthur (New York: International Publishers, 1970): 47. "If in all ideology men and their circumstances appear upside-down as in a camera obscura, this phenomenon arises just as much from their historical life-process as the inversion of objects on the retina does from their physical life-process."

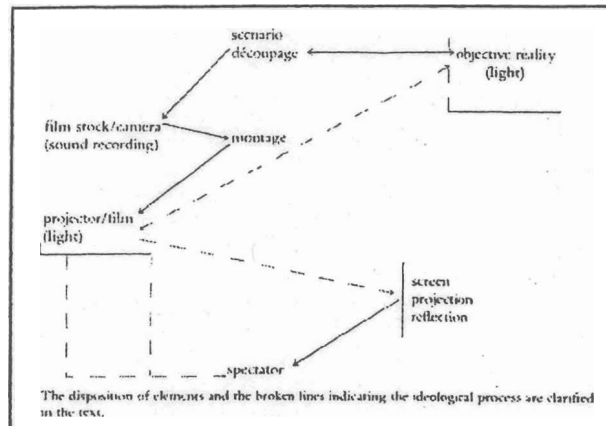


diagram from Jean-Louis Baudry, "Ideological Effects of the Basic Cinematographic Apparatus"

⁶⁹ Hubert Damisch, *The Origin of Perspective*, trans. John Goodman (Cambridge, MA: MIT Press, 1995): xiv-xv.

⁷⁰ Jean Louis Baudry, "Ideological Effects of the Basic Cinematographic Apparatus," published in *Cinéthique* (1970) nos. 7-8 ; translated by *Film Quarterly* (winter 1974-75), 28(2): 39-47.

⁷¹ Damish, *The Origin of Perspective*, xiv-xv.

⁷² Damish, *The Origin of Perspective*, xvii.

⁷³ A recent collection of writings includes determinative essays to the on Structuralist-materialist project: Peter Gidal, "Theory And Definition Of Structuralist/ Materialist Film"; Stephen Heath, "Repetition Time: Notes Around 'Structuralist/Materialist Film'"; Malcolm Le Grice, "The History We Need"; Lis Rhodes, "Whose History?" See: Michael O'pry (Ed.), *The British Avant-Garde Film 1926 to 1995: An Anthology of Writings* (London: Paul & Co Pub Consortium, 2003).

⁷⁴ Stan Brakhage, *Metaphors on Vision* (Special issue of *Film Culture*, 1963). Certainly Brakhage's project as a filmmaker explored the apparatical limits of the materials of filmmaking and challenged habits of perception and vision. David James suggests: "Brakhage's compositional attention to the entire frame, especially to its edges, produces the "all-over" decenteredness of abstract expressionism rather than the centered subjectivity of perspective painting." See David E. James, "Stan Brakhage: The Filmmaker as Poet," in *Allegories of Cinema: American Film in the Sixties* (Princeton: Princeton University Press, 1989): f.11, 47; 28-57.

⁷⁵ Christian Metz, "Le signifiant imaginaire," in *Communications*, no. 23 (1975): 3-56. The special issue (#23) of *Communications*, "Psychoanalyse et cinéma," contained pieces by Metz, Baudry, Kristeva, Guattari, Barthes, Kuntzel, Bellour and Nick Browne. Four of Metz's essays were collected and published in the 10/18 series as *Le signifiant imaginaire: Psychoanalyse et cinéma* (Paris: Union générale d'Éditions, 1977). The cover of the 1977 paperback has a 19thc drawing of a projecting praxinoscope casting projected images onto a screen. This volume was translated as Christian Metz, *The Imaginary Signifier: Psychoanalysis and Cinema*, translated by Celia Britton, Annwyl Williams, Ben Brewster and Alfred Guzzetti (Bloomington: Indiana University Press, 1982): 49.

⁷⁶ Quoted in Heath, p29.f9 Marcelin Pleynet, interview (with Gerard Leblanc), *Cinethique*, no. 3 (1969).

⁷⁷ Stephen Heath, "Narrative Space," *Screen*, volume 17, no.3 (Autumn 1976): 68-112, reprinted in *Questions of Cinema* (Bloomington: Indiana University Press, 1981): 19-75.

28. The quotes from Heath that follow are taken from the *Questions of Cinema* version. Marcelin Pleynet's work formulated this directly: "a camera productive of a perspective code directly constructed on the model of the scientific perspective of Quattrocento" M. Pleynet, interview *Cinéthique* (1969): 20, quoted in Heath "Narrative Space," *Questions of Cinema* n386.

Heath's premises in this essay were challenged in a lengthy and zealous attack by Noël Carroll in "Address to the Heathen," *October* 23 (Winter 1982) and responded to by Heath in "Le Père Noël," in *October* 26 (Fall 1983):63-115. While much of Carroll's animus is directed toward his rejection of Heath's Lacanian-Althusserian premises, Carroll's rejoinder to Heath's account of perspective as ideological is to claim instead the accuracy of perspectival representation "not a dissimulation/counterfeit replica of vision, but the most accurate means of rendering information about spatial appearance." Carroll, "Address to the Heathen," *October* 23 (Winter 1982) :114.

⁷⁸ Stephen Heath, "Narrative Space," 28. The camera represented autonomous vision—the kino-eye, the cyborg-eye, vision that did not depend on the human organ for sight.

⁷⁹ Heath, "Narrative Space," 28-29. Heath emphasizes central perspective's "ceaseless confirmation of the importance of centre and position" and insists, "What must be more crucially emphasized is that the ideal of a steady position, of a unique embracing center..." The "cost of such fixed centrality" is the anamorphic distortion caused when the eye is not centered.

⁸⁰ Heath, "Narrative Space," 28. Although Heath mentions the Latin *istoria* in parenthesis here he does not suggest how *istoria*—the Latin for narrative or holy "story"—is related to "framed, centred, harmonious." In the larger logic of his essay, Heath argues that narrative serves to fulfill the functions that perspective does: centering and framing.

⁸¹ Heath, "Narrative Space," 34.

⁸² Stephen Heath, "Narrative Space," 30.

⁸³ Heath, "Narrative Space," 31.

⁸⁴ Claus Grimm, *The Book of Picture Frames* (New York: Abaris Books, 1992): 25.

Certainly there were few pictures serving as movable furnishings for any and every private room. But in stately secular rooms there were already areas painted with illusionistic pictures, which were surrounded with ornamental bands and painted friezes; this is proved by the late classical wall painting.

While the beginnings of the painterly frame are not exact, the end of the picture frame is within recent memory. Malevich preferred no frame; Mondrian rejects the frame. When, in 1954, Frank Stella left the edge of the canvas visible, used thicker canvas supports, the material support of the painting was revealed. See also: Piers and Caroline Fretham, *The Art of Framing* (New York: Clarkson Potter, 1997); Desmond MacNamara, *Picture Framing: A Practical Guide from Basic to Baroque* (London: David and Charles Publishers, 1986).

⁸⁵ A recent collection of essays examines the boom in panel painting in Italy from the middle of the thirteenth century onward. Panel painting was not confined to altarpieces, but also transformed existing object types, including painted crosses, altar frontals, and monumental panels of the Virgin and Child and brought on new surfaces for painting, lunette-shaped panels for architectural settings, small-scale panels for personal devotion, and painted chests for private homes. See: *Italian Panel Painting Of The Duecento And Trecento*, edited by Victor M. Schmidt (New Haven: Yale University Press, 2002).

⁸⁶ Grimm, 26. There are many questions about the history of the frame which I will not pursue here: the relation of the frame to its architectural surround, to the ornamentation found on adjacent doors and windows, the relation of framing motifs to book cover motifs, the difference between frames of text and frames of image, frames as architectonic structures separating the multi-partite sequences in triptychs and polyptychs, the relation of the pictorial frame to the theatrical proscenium frame, etc.

⁸⁷ While an examination of the stylistic relation of the picture frame to its painting cannot be addressed in the scope of this study, it would be an important study to undertake. In his discussion of "The Psychology of Styles," Ernst Gombrich asks: "we may ask whether there is a link between a painting and its frame..." His formulation of the "organic unity" between these separate elements resembles Derrida's *paraergon*: "or more specifically between all the elements of a Gothic altar, the shrine with its sculptures, the wings with their reliefs and painted panels and the architectural detail of its fretwork setting." The figure that he attaches to illustrate this question--the high altar of the Klosterkirche in Blaubeuren Germany (1493-4)--displays an altar with panel paintings, placed below the Gothic cove of three arched leaded glass windows. Ernst Gombrich "The Psychology of Styles," Chapter 8 of *The Sense of Order* (1979) reprinted in *The Essential Gombrich: Selected Writings on Art and Culture*, edited by Richard Woodfield (London: Phaidon Press, 1996): 264.

⁸⁸ The painter could carry his easel into the landscape. Evidenced in many Renaissance paintings—Rembrandt's self-portrait, "Artist in his Studio" (1629), Valesquez' "Las Meninas," (1656-7) the presence of the easel marked the painter's activity.

⁸⁹ Michael Baxandall describes the relation between Quattrocento cognitive style and Quattrocento pictorial style as a "period eye." Michael Baxandall, *Painting and Experience in Fifteenth Century Italy: a primer in the social history of pictorial style* (Oxford: Oxford University Press, 1972):

⁹⁰ John Berger, *Ways of Seeing*, (London: Penguin Books, 1972): 109. Michael Baxandall also described the painting as a "deposit" when, in the first sentence of his 1972 study *Painting and Experience in Fifteenth Century Italy*, he proclaimed: "A fifteenth century painting is the deposit of a social relationship." Baxandall's work describes the pleasures of possession, and the contract between painters and their clients. Baxandall, *Painting and Experience in Fifteenth Century Italy: a primer in the social history of pictorial style* (Oxford: Oxford University Press, 1972): 1.

⁹¹ Heath, "Narrative Space," 34.

⁹² Heath, "Narrative Space," 35.

⁹³ Hubert Damisch, *The Origin of Perspective*, trans. John Goodman (Cambridge, MA: MIT Press, 1995): 170.

⁹⁴ Lew Andrews, *Story and Space in Renaissance Art: The Rebirth of Continuous Narrative* (Cambridge: Cambridge University Press, 2000).

⁹⁵ Metz, *Imaginary Signifier*, p. 49.

⁹⁶ Heath, "Narrative Space," 32.

⁹⁷ Baudry, "Ideological Effects," 292.

⁹⁸ Kaja Silverman, *The Threshold of the Visible World* (New York: Routledge, 1996): 125. See also my account of the primary, secondary and tertiary registers of identification: Anne Friedberg, "A Denial of Difference: Theories of Cinematic Identification," in *Psychoanalysis and Cinema*. Edited by E. Ann Kaplan. (New York: Routledge, 1989): 36-45.

⁹⁹ Jean-Pierre Oudart's essays on "suture" in *Cahiers du Cinema* in 1969, 1970, 1971, were written in the context of many post-May '68 film debates in French journals *Tel Quel*, *Cinethique*, *Cahiers du Cinema* which engaged with Althusserian concepts of ideology and Lacanian psychoanalysis. Oudart's writing was translated into English in the British journal *Screen* in 1977/78. Using Lacan's notion of the subject "suturing" the "lack," Oudart adapted the metaphor of suture to his account of the spectator's reaction to shot transitions. Oudart describes the spectator's switch from enjoying the plenitude and *jouissance* of an image to the discovery of its frame. In this argument, Oudart maintains that this realization reveals the absent space outside of the frame and exposes the film as constructed/ enunciated operation. Once the spectator notes the frame, the spectator asks: whose point of view? For the dossier of debate on "suture" see: Jacques-Alain Miller, "Suture (elements of the logic of the signifier)," *Screen*, vol. 18, no. 4 (1977/78): 29-34; Jean-Pierre Oudart, "Notes on Suture," *Screen*, vol. 18, no.4 (1977/78): 35-47; Stephen Heath, "Notes on Suture," *Screen*, vol. 18, no. 4 (1977/78): 48-76; Daniel Dayan, "The Tutor-Code of Classical Cinema," (1974) in Leo Braudy and Marshall Cohen, editors, *Film Theory and Criticism, Fifth Edition* (New York: Oxford University Press, 1999): 118-129; William Rothman, "Against the System of the Suture" (1975) in Leo Braudy and Marshall Cohen, editors, *Film Theory and Criticism, Fifth Edition* (New York: Oxford University Press, 1999): 130-136.

¹⁰⁰ "It is the differences in frame between film and painting that are generally emphasized: film is limited to a standard screen ratio (the three to four horizontal rectangle)." Stephen Heath, "On Screen, in Frame: Film and Ideology," (1975) first published in *Quarterly Review of Film and Video*, vol. 1, no 3 (August 1976): 251-265, and reprinted in *Questions of Cinema* (London: Macmillan, 1981): 10. Heath's interest in frames and screens makes a fugal reappearance in other essays: "Narrative Space," (1976) and "Screen Images, Film Memory" *Edinburgh '76 Magazine* (1976): 33-42. In "Narrative Space" Heath writes: "In a sense, moreover, the constraint of the rectangle is even greater in the cinema than in painting: in the latter proportions are relatively free; in the former, they are limited to a standard aspect ratio (Frampton's 1.33 to 1 rectangle, the aptly named 'academy frame') or as now, to a very small number of ratios." *Questions of Cinema* (London: Macmillan, 1981): 35.

I will discuss the postwar expansion of the frame's rectangle—in Cinemascope and Cinerama—as important indications of the changing notion of the screen as "window" in Chapter 4.

¹⁰¹ Vivian Sobchack provides a critique of film theory's use of the metaphor of the frame and the metaphor of the window and the metaphor of the mirror along phenomenological lines. See: Vivian Sobchack, *The Address of the Eye: Phenomenology and the Film Experience* (Princeton: Princeton, N.J., 1992).

¹⁰² "Apparatus theory" met with theoretical challenges on a number of fronts. Feminist film theorists challenged the ungendered accounts of visuality implicit in theories of the apparatus that assumed a spectator unaffected by its gendered body or psyche. In her "feminal" essay, "Visual Pleasure and Narrative Cinema" (1975) Laura Mulvey qualified the relation between spectator and screen, by introducing a specific equation between the viewing position of "man as bearer of the look" and the "spectacle" of "woman as object of the look." See; Laura Mulvey, *Visual and Other Pleasures* (Bloomington: Indiana University Press, 1989): 3-26. Other critiques of the implicit gendering of the conventions of "looking" can be found in: Sandy Flitterman-Lewis, "Woman, Desire, and the Look: Feminism and the Enunciative Apparatus in Cinema," *Ciné-Tracts*, vol.2, no. 1 (1978): 63-68; Linda Williams, "Film Body: An Implantation of Perversions,"; Lucy Fisher, "The Image of Woman as Image: The Optical Politics of Dames," in *Genre: The Musical*, ed. Rick Altman (London: Routledge and Kegan Paul, 1981): 70-84, and Kaja Silverman, *The Subject of Semiotics* (New York: Oxford University Press, 1983): 222-236. For a sustained analysis and nuanced critique of Metz and Baudry see: Mary Ann Doane, *Femmes Fatales: Feminism, Film Theory, Psychoanalysis* (New York: Routledge, 1991).

On another front, "apparatus theory" was vigorously challenged by Noel Carroll, David Bordwell and others for its Lacanian, Althusserian premises. See: David Bordwell and Noel Carroll, editors, *Post-Theory: Reconstructing Film Studies* (Madison: University of Wisconsin Press, 1996). Jacques Aumont stages a veiled attack on apparatus theory, positing a change between 1780 and 1820 in the switch between the *ébauche* (the sketch) and the *étude* (the study). Jacques Aumont, "The Variable Eye, or the Mobilization of the Gaze," translated by Charles O'Brien and Sally Shafto in *The Image in Dispute: Art and Cinema in the Age of Photography*, ed. Dudley Andrew (Austin: University of Texas Press, 1997): 231-258.

¹⁰³ While Lacan invoked the mirror as a model for the visual scenario of identity formation, his most elaborate theorization of the constitutive scenarios of vision rely on the metaphor the screen (*écran*). Apparatus theories seemed more taken by the mirror metaphor than the screen. See footnote #67 in Introduction.

¹⁰⁴ David Bordwell, *Narration in the Fiction Film* (Madison: University of Wisconsin Press, 1985): 107. Bordwell divides theories of narration into two broad categories, those which involve "showing" and those that involve "telling." While this is a useful distinction, he also equates "mimetic theories of narration" with showing and "diegetic theories of narration" with the telling. This reader finds these latter categories to confuse the issue rather than to provide further clarification. "Mimetic" implies the realism of imitation, not the fictional status of the image in visual narration; and "diegetic" refers to a fictional world, and yet fictional does not imply a mode of telling not showing. One can certainly have a diegetic spectacle, i.e. a purely visual-fictional diegetic world. See also David Bordwell, *On the History of Film Style* (Cambridge: Harvard University Press, 1997).

¹⁰⁵ David Bordwell, *Narration in the Fiction Film*, 107-109.

¹⁰⁶ David Bordwell, *Narration in the Fiction Film* (Madison: University of Wisconsin Press, 1985): 4-15.

¹⁰⁷ David Bordwell, *Narration in the Fiction Film*, 5.

¹⁰⁸ David Bordwell, *Narration in the Fiction Film*, 4, 7.

¹⁰⁹ The theoretical stand-off between psycho-analytically inflected apparatus theory and the cognitive Reformation of post-70s film theory was acted out in the debate between Stephen Heath and Noel Carroll in subsequent issues of the journal *October* in 1983. Carroll and Bordwell both took up the banner of refuting the claims of apparatus theory in their book *Post-Theory: Reconstructing Film Studies* (Madison: University of Wisconsin Press, 1996).

Despite the theoretical posturing of difference, there are marked similarities to be found in the writing of Heath and Bordwell.

¹¹⁰ Bordwell misses this important distinction. He writes: "Perspective (from the Italian *prospettiva*) means, we are reminded often enough "seeing through." (5) He has the terminological definition wrong. *Perspectiva* means "seeing through"; *Prospettiva* means "seeing in front of."

¹¹¹ Richard DeCordova has argued this point with fine-tuned historical specificity in "From Lumière to Pathé: The Break-Up of Perspectival Space," in *Early Cinema: Space, Frame, Narrative*, edited by Thomas Elsaesser (London: BFI, 1991): 76-85. First published in *Cine-Tracts*, Vol. 4. Nos 2 and 3 (Summer, Fall 1981): 55-63.

¹¹² In *Cinema I: Image-Movement* (1986), Gilles Deleuze breaks down the moving image (*movement-image*) into its constituent frames and examines and expands upon these variables in analytic detail. One of Deleuze's categories, which I will examine in the final chapter, is a framed moving image which contains another frame. Gilles Deleuze, *Cinema I: Movement-Image*, translated by Hugh Tomlinson (Minneapolis: University of Minnesota Press, 1986).

¹¹³ Baudry, "Ideological Effects," 290.

¹¹⁴ Baudry, "Ideological Effects," 290

¹¹⁵ Baudry, "Ideological Effects," 290, 293.

¹¹⁶ Noel Carroll's objection to Heath is based on Heath's claims for narrative as a perspective system, for the equation of perspective and narrative. See: Noel Carroll, "Address to the Heathen", *October* 23 (Winter 1982): 89-163; Stephen Heath refutes Carroll's critique in "Le Père Noël," *October* 26 (1983): 63-115.

Gombrich on one-point perspective:

Could other systems of representation elicit the same complex and manifold type of reaction? Questions such as these are more easily asked than answered....How can we explain this undeniable success of perspective if it were only another mapping method that must be learned to be decoded? Is it not more plausible to think that there is indeed something compelling in the trick even though it achieves genuine illusion only in such special cases as in peep-shows, on the perspective stage, or in illusionist ceilings seen from the right place?

E.H. Gombrich, "The 'What' and the 'How': Perspective Representation and the Phenomenal World," in *Logic and Art: Essays in Honor of Nelson Goodman*, eds Richard Rudner and Israel Scheffler (Indianapolis: Bobbs-Merrill, 1972): 148.

¹¹⁷ Heath, "Narrative Space," 44. Heath's arguments about narrative are also closely related to the core of Gunning's "cinema of attractions" argument—that the fascination with pure movement subsided as narrative took over. While Gunning doesn't address perspective, the framing of movement, or the tension between the movement of the virtual image and the stasis of the spectator, his argument about the emergence of narrative suggests that story-telling aspects exceeded and/or instrumentalized story-showing aspects in service of narrative logic.

¹¹⁸ In this regard, the revisionist film histories of the last two decades (Rossell, Manoni, Gunning) have recast the considerations of early cinema from its development as a form of story-telling to its place in the radically new perceptual habits (of movement, of illusion of life/virtuality). See: Laurent Mannoni, *The Great Art of Light and Shadow: Archeology of Cinema*, translated by Richard Crangle (Exeter: University of Exeter Press, 2000); Deac Rossell, *Living Pictures: The Origins of the Movies* (Albany: State University of New York Press, 1998).

¹¹⁹ Quoted in Heath, "Narrative Space," 27. Quoted from "Espace et Illusion," *Revue internationale de filmologie* (1948): 2 (5)66. Heath makes a complex claim for cinematic specificity, claiming that the 'partial unreality of film' ('something between' two dimensions and three) is what makes this construction of space possible.

¹²⁰ Heath, "Narrative Space," 44.

¹²¹ Kristin Thompson "Classical narrative space and the spectator's attention," Chapter 17 in David Bordwell, Janet Staiger, Kristin Thompson *The Classical Hollywood Cinema: Film Style and Mode of Production to 1960* (New York: Columbia University Press, 1985): 214.

¹²² Kristin Thompson, in David Bordwell, Janet Staiger, Kristin Thompson *The Classical Hollywood Cinema: Film Style and Mode of Production to 1960* (New York: Columbia University Press, 1985): 215. Elsewhere in the same volume, David Bordwell describes how cinematic space is tailored to the demands of narration:

Classical narration of space thus aims at orientation: The scenography is addressed to the viewer. Can we then say that a larger principle of 'perspective' operates here—not the adherence to a particular spatial composition but a general 'placing' of the spectator in an ideal position of intelligibility?

David Bordwell, "Space in the classical film," Chapter 5 of *Classical Hollywood Cinema: Film Style and Mode of Production to 1960* (New York: Columbia University Press, 1985): 54. In a footnote to this passage, Bordwell references Stephen Heath.

¹²³ "There are no jerks in time and space in real life. Time and space are continuous."

Rudolf Arnheim, *Film as Art*, (Berkeley: University of California Press, 1971): 21.

¹²⁴ André Bazin, "The Evolution of the Language of the Cinema," in *What Is Cinema? Volume I*, trans. Hugh Gray (Berkeley: University of California Press, 1967): 23-40.

¹²⁵ As I will argue in more detail in chapter five of this book, although there are scattered exceptions, through most of the century that constitutes the history of the moving image, the frame was most often a single frame. The conventions of editing developed to stitch the separate spaces together in a logic of successive continuity, relied on a single framed image.

¹²⁶ While phenomenological accounts of film spectatorship that insist on the body of the observer may seem, at first, to be congruent with Crary's claims for the "carnal density"

of vision, his argument is based on the retinal properties of the viewing with devices like the *stereoscope* and *phenakistoscope*, and not on bodily effects of viewing.

¹²⁷ Gordon Hendricks, *The Kinetoscope: America's First Commercially Successful Motion Picture Exhibitor* (New York: The Beginnings of the American Film, 1966).

¹²⁸ Although here I am drawing a broad contrast between the implicit viewing systems of the *kinetoscope* and the *Cinématographe*, the exacting details of the many patented inventions and inventors leads to a much more nuanced account. The "first" public projection is a matter of historical debate: Max Skladanovksy debuted his Bioskop film projection device in the Berlin Wintergarten in November 1895. And although not intended for public display, in 1892, Marey had a design for a primitive projection mechanism to display his images of analyzed motion. In their February 13, 1895 patent, August and Louis Lumière first deemed their device a "projecting chronophotographe." The March patent renamed the device "Cinématographe." [This is footnoted in Marta Braun, *Picturing Time* (Chapter Four, footnote 69, pp. 407: French patent 245,032).] Laurent Mannoni, *The Great Art of Light and Shadow: Archeology of Cinema*, translated by Richard Crangle (Exeter: University of Exeter Press, 2000); Deac Rossell, *Living Pictures: The Origins of the Movies* (Albany: State University of New York Press, 1998).

¹²⁹ Jonathan Crary, *Techniques of the Observer*, 1.

¹³⁰ Marta Braun, *Picturing Time: The Work of Etienne-Jules Marey (1830-1904)* (Chicago: University of Chicago Press, 1992): 281.

¹³¹ Hollis Frampton, "Eadweard Muybridge: Fragments of a Tesseract," *Artforum*, March 1973, 43-52. Special issues of the journal *October* have explored Frampton's exceptionally rich *oeuvre* of films and writings. See: *October* 32 (Spring 1985) and *October* 109 (Summer 2004). A tesseract (Gk: *tessares* four + *aktis* ray) is a three-dimensional hypercube taken to the next exponent, the fourth dimension, time.

¹³² Three recent books should be noted: Marta Braun's detailed research and analysis of the work of Etienne Jules Marey forcefully decontextualizes Marey from his previous historical position as merely a "precursor" to futurism, the cinema, and the scientific management studies of Frank Gilbreth and places Marey's project and commitments in terms of 19th century positivism and scientific thought. Marta Braun, *Picturing Time: The Work of Etienne Jules Marey (1830-1904)* (Chicago: University of Chicago Press, 1992). Rebecca Solnit dramatizes Muybridge's "annihilation of time and space" in a recent biography, *River of Shadows: Eadward Muybridge and the Technological Wild West* (New York: Viking, 2003). In *The Emergence of Cinematic Time: Modernity, Contingency, the Archive*, Mary Ann Doane situates the work of Marey and Muybridge in relation to the emergent cinematic modes of restructuring of time and contingency. Mary Ann Doane, *The Emergence of Cinematic Time: Modernity, Contingency, the Archive* (Cambridge: Harvard University Press, 2002).

¹³³ E.J. Marey, *Animal Mechanism: A Treatise on Terrestrial and Aerial Locomotion* (New York: D. Appleton and Company, 1874). This volume has 117 plates, etchings and charts, no photographs.

¹³⁴ In 1882, Marey wrote to his mother: "I have a photographic gun [*fusil photographique*] that has nothing murderous about it and that takes pictures of a flying bird or running animal in less than 1/500 of a second." Quoted in Marta Braun, *Picturing Time*, 57.

¹³⁵ Marta Braun, *Picturing Time*, 64. Marey seems to have used the same phrasing as Descartes for the shutter aperture as “window.”

¹³⁶ My discussion of Marey is briefly reductive of his single-plate chrono-photography. As detailed by Braun, Marey also built a multiple lens camera to allow for each lens to sequentially expose onto same plate. In addition, Marey’s work with Albert Londe and Jean-Martin Charcot (who died in 1893) See Marta Braun, pp. 85-91) Also Marey’s work at the Station Physiologique on human locomotion and fatigue is analyzed in a different light by Anson Rabinbach, *Human Motor: Energy, Fatigue and the Origins of Modernity* (Berkeley: University of California Press, 1992).

¹³⁷ E.J. Marey *Animal Mechanism: Terrestrial and Aerial Locomotion* (New York: D. Appleton and Company, 1874). In 1874, Muybridge “shot” his wife’s lover and was charged with murder. At the same time Muybridge was evading murder charges, Marey was investigating the photographic revolver of Pierre-César Jules Janssen (used to record Venus’ movement across the sun in December 1874). Perhaps Muybridge’s crime lingered in Marey’s mind when, in 1882, he wrote to his mother: “I have a photographic gun that has nothing murderous about it” (Braun, 57)

¹³⁸ Siegfried Giedion makes a distinction between the two methods of recording movement in *Mechanization Takes Command* (New York: Oxford University Press, 1948): 14-30. Marta Braun draws exacting distinctions between the goals and methods of Marey and Muybridge: “Marey wanted to give a visible expression to the continuity of movement over equidistant and known intervals....and to do so within a single image.” (xvii) Muybridge’s photographs, Braun argues, were not “scientific depictions of movement, but fictions.” (xvi) Marta Braun, *Picturing Time: The Work of Etienne-Jules Marey (1830-1904)* (Chicago: University of Chicago Press, 1992). Braun’s contrast of Muybridge and Marey centers on their separate valuation of the realist/ positivist aspects of the camera. Marey, she argues: “used his camera to work directly against a code of perspective, built on the model of the scientific perspective of fifteenth century Italy.” while Muybridge’s “narrative fantasies” duplicated “exactly those illusions Marey tried all his life to avoid.” (254- 255).

¹³⁹ For analysis of Muybridge and his gendered subjects see Linda Williams, *Hard Core: Power, Pleasure and the Frenzy of the Visible* (Berkeley: University of California Press, 1989). For a further discussion of Muybridge and cinematic illusion see: Mieke Bal, “The Gaze in the Closet,” in *Vision in Context*, Teresa Brennan and Martin Jay, eds. (New York: Routledge, 1996).

¹⁴⁰ Mary Ann Doane, *The Emergence of Cinematic Time: Modernity, Contingency, the Archive* (Cambridge: Harvard University Press, 2002).

¹⁴¹ As Marey wrote: “Cinema produces only what the eye can see in any case. It adds nothing to the power of our sight, nor does it remove its illusions.” Etienne-Jules Marey, preface to Charles-Louis Eugene Trutat, *La photographie animée* (Paris: Gauthier-Villars, 1899): ix. [Quoted in Marta Braun, *Picturing Time* footnote 32 p. 413.]

¹⁴² Kuntzel describes *defilement*:

“Défilement ... means, in the vocabulary of cinema 'progression, the sliding of the film-strip through the gate of the projector' and, in military art, the use of the terrain's accidents or of artificial constructions to conceal one's movements from the enemy. In the unrolling of the film, the photograms

which concern us 'pass through,' hidden from sight what the spectator retains is only the movement within which they insert themselves...

Between the space of the film-strip and the time of the projections the film *rubs out*: movement erases its signifying process, and eventually conceals some of the images which pass too rapidly to be 'seen'...."

Thierry Kuntzel, "The Défilement: A View in Close-Up," trans. by Bertrand Augst, *Camera Obscura* No. 2, (Fall 1977): 56, reprinted in *Apparatus*, edited by Teresa Hak Kyung Cha (New York: Tanam Press, 1981): 233-241. **NEED CITATION OR OMIT** Rene Bruckner, a PhD. candidate in Visual Studies at UC/Irvine argues that the cinematic apparatus, whose image is produced by the rapid replacement of one instantaneous snapshot with another, must perpetually disappear in order to appear at all.

¹⁴³ In *Window Shopping*, this was a central aspect of my argument about the fluid temporalities and "proto-postmodernity" of the "mobilized virtual gaze" The coincidence of H.G. Wells' publication of his time-travelling novel, *The Time Machine* and British inventor R.W. Paul's application for a patent for a device to travel through time in 1895 marked the cinema as an apparatus for time travel. See: in *Window Shopping* **ADD pp.**

¹⁴⁴ Vachel Lindsay, *The Art of the Moving Picture* [1915] (New York: Modern Library Paperback Edition, 2000).

¹⁴⁵ In fact, Panofsky's own instability about the title to his essay, "On Movies" (1936), "Style and Medium in Moving Pictures" (1937, 1940), and "Style and Medium in Motion Pictures" (1947) is an indication of the mobility of terminology around the medium's specificity of movement. Erwin Panofsky, "On Movies," *Princeton University, Department of Art and Archeology, Bulletin* (1936): 5-15; "Style and Medium in the Moving Picture," *Transition* 26 (1937): 121-133; "Style and Medium in the Motion Pictures (1947)," a later version of the essay, first published in *Critique, A Review of Contemporary Art* 1 (1947): 5-28; reprinted in *Three Essays On Style*, edited by Irving Lavin (Cambridge: MIT Press, 1995): 93-126.

¹⁴⁶ As discussed in the previous chapter, when Panofsky's incisive isolation of these two specificities are held up to his writing on perspective as a "symbolic form," he seems to be approaching—but not yet willing to assert— the "motion picture" as a post-perspectival "symbolic form."

¹⁴⁷ In *Open Sky*, Paul Virilio opens his account with the horizon and the limitless blue sky above:

Besides, the entire history of Quattrocento perspectives is only ever a story of struggle, of the battle of geometers vying to make us forget the 'high' and the 'low' by pushing the 'near' and the 'far,' a *vanishing point* that literally fascinated them even though our vision is actually determined by our weight and oriented by the pull of earth's gravity, by the classic distinction between *zenith* and *nadir*.

Paul Virilio, *Open Sky*, translated by Julie Rose (London: Verso, 1997): 1.

LENS II: HEIDEGGER'S FRAME

Philosophical Paradigm and Aesthetic Device

"The fundamental event of the modern age is the conquest of the world as picture"--Martin Heidegger, "The Age of the World Picture"(1938"

In his 1938 lecture, "The Establishing by Metaphysics of the Modern World Picture" (later re-titled "The Age of the World Picture"), Heidegger located the metaphysical shift into the "modern age" (*Neuzeit*) at the moment, loosely historicized, when "the world becomes picture."² To Heidegger, this transformation of the world (*Welt*) into "picture" (*WeltBild*) "is one and the same event" with the Descartes' 17th century *Meditations* on the *subjectum* who represents the world through thought-- *ego cogito (ergo) sum*.³ Heidegger did not mention perspective as a component factor for this standing-outside-of representation, yet he equates this new form of mental "representation" (*Vorstellung*) with the visual metaphor of the "picture" and its implied frame.

Heidegger asserted: "That the world becomes picture is one and the same event with the event of man's becoming *subjectum* in the midst of that which is."⁴ "Now," he writes, "for the first time is there any such thing as a 'position' (*Stellung*) of man."⁵ "The word 'picture' (*Bild*)," Heidegger continued, "now means the structured image (*Gebild*), that is the creature of man's producing which represents and sets before."⁶

A decade later in a series of lectures he gave in Bremen in 1949/1950, Heidegger introduced a new component of the picture (*Gebild*)--the frame (*das Ge-stell*)-- as a metaphor for "representational thought".⁷ For Heidegger, the *Ge-stell* became a key figure in his metaphysical portrait of the world "conceived and grasped as a picture"-- a world picture (*Weltbild*) in a world set-before (*vorstellen*).⁸ The *Ge-stell* organizes perception, sets everything in place, ordered the world.⁹ Heidegger did not assess the visual aspects of this framing; for him the *Ge-stell* was a philosophical "enframing" which transforms the world into objects, into a "standing reserve" (*Bestand*) awaiting its representation, ready for its close up.¹⁰

Of course, Heidegger and his contemporaries were deeply concerned about the effects of modernity---industrialization, commodification, mass entertainment-- and the technologies which were darkening its skies. In Heidegger's loosely historicized "modern

age,” the effects of industrialization and commodification were succinctly illustrated in his description of the hydro-electric plant on the Rhine.

The hydro-electric plant is not built into the Rhine River as was the old wooden bridge that joined bank with bank for hundreds of years. Rather the river is dammed up into the power plant. What the river is now, namely, a water power supplier, derives from out of the essence of the power station. In order that we may even remotely consider the **monstrousness** (*das Ungeheuere*) that reigns here, let us ponder for a moment the contrast that speaks out of the two titles, “The Rhine” as dammed up into the *power* works, and “The Rhine” as uttered out of the *art* work in Hölderlin’s hymn by that name. But, it will be replied, the Rhine is still a river in the landscape, is it not? Perhaps. But how? In no other way than as an object on call for inspection by a tour group ordered there by the vacation industry.” (emphasis added)

Here, the landscape of the natural world is no longer a river and its banks, but a “water power supplier” transformed into a “standing reserve” for technology’s instrumentalization. The relation between the river and the wooden bridge changes with industrialization; the power plant transforms the Rhine. And, as evident in Heidegger’s snide quip about the tourist group “ordered there by the vacation industry,” the river becomes a tourist site, an “object on call.” Heidegger’s “frame” here is metaphysical, not literal. But we might easily carry forth his thought to include the metaphysics of the literal frame. Consider, a (now perhaps) post-modern visitor to a river, as described by the artist Robert Smithson:

Noonday sunshine cinema-sized the site, turning the bridge and the river into an over-exposed *picture*. Photographing it with my Instamatic 400 was like photographing a photograph. The sun became a **monstrous** light-bulb that projected a detailed series of “stills” through my Instamatic into my eye. When I walked on the bridge, it was as though I was walking on an enormous photograph that was made of wood and steel, underneath the river existed as an enormous movie film that showed nothing but a continuous blank.¹² (emphasis added)

Heidegger did not walk on the bridge that joins the banks of the Rhine, but he knew that something “monstrous” has transformed the river. For Smithson, this “monstrous” something has transformed nature even further. The sun “became” a “monstrous light-

bulb." Smithson walks on the bridge which is now a photograph, and the river has become a moving image film. Smithson's river is a pre-structured image, a *Ge-bild*, a picture that is not merely a pre-framed still photograph but also a "movie film" of moving images. The transformation of nature into representation is now more complete—the sun is a "monstrous lightbulb" which "cinema-sizes" the site, projecting images through the "Instamatic" camera back into the eye of Smithson.

Heidegger was certainly aware of the subjective changes produced by communication technologies ("...we whose hearing and seeing are perishing through radio and film under the rule of technology....")¹³ Witness his opening comments in the first of his 1949 Bremen lectures, "The Thing":

All distances in time and space are shrinking. Man now reaches overnight, by plane, places which formerly took weeks and months of travel. He now receives instant information, by radio, of events which he formerly learned about only years later, if at all. The germination and growth of plants, which remained hidden throughout the seasons, is now exhibited publicly in a minute, on film. Distant sites of the most ancient cultures are shown on film as if they stood this very moment amidst today's street traffic. Moreover, the film attests to what it shows by presenting the camera and its operators at work. The peak of this abolition of every possibility of remoteness is reached by television, which will soon pervade and dominate the whole machinery of communication.¹⁴

Despite his constant questioning of unquestioned terms, when Heidegger addresses the technological apparatuses of radio, television, and film he avoids questioning their literal frames—the film or television screen.¹⁵ For Heidegger, the frame is only a metaphor for the "en-framing" implicit in modern thought and experience.¹⁶ Heidegger does not address the visual system of perspective, yet Panofsky's claim for perspective as a "*triumph of the distancing and objectifying sense of the real and ...of the distance-denying human struggle for control*" seems to bear an uncanny similarity to the Heideggerian *Gestell*.

Nevertheless, Heidegger's questioning of technology and the metaphysics of the frame will set the stage for our questioning of the everyday frames through which we see things—the "material" frames of computer screens, car windshields, television sets, movie screens—because the frame itself carries with it some subjective consequences. Like perspective, both the window and the frame serve as philosophical paradigms and

aesthetic devices. To invoke Heidegger here, at the cusp of new paradigms of thought and representation, will provide a grounding metaphysic for the dominance of the frame and its visual system.

¹“*Der Grundvorgang der Neuzeit ist die Eroberung der Welt als Bild.*” Martin Heidegger, “The Age of the World Picture (1938)” published in *The Question Concerning Technology and Other Essays*, translated by William Lovitt (New York: Harper and Row, 1977): 134. “*Die Zeit des Weltbildes*” (“The Age of the World Picture”) was Heidegger’s published version of a lecture entitled “The Establishing by Metaphysics of the Modern World Picture” given on June 9, 1938. Many of its concepts were revised, repeated in four lectures given in Bremen in 1949/1950--“*Das Ding*” (“The Thing”), “*Das Ge-stell*” (“Enframing”), “*Die Gefahr*” (“The Danger”), “*Die Kehre*” (“The Turning”)-- and in the lecture “*Die Frage nach der Technik*” given in Munich on November 18, 1955. The German text “*Die Zeit des Weltbildes*” appears in *Holzwege* (Frankfurt am Main: Vittorio Klostermann, 1950): 69-104. I have relied on both the German text and the Lovitt translations.

²“...the fact that the world becomes picture at all is what distinguishes the essence of the modern age.” “Age of the World Picture,” p. 130./ “...daß überhaupt die Welt zum Bild wird, zeichnet das Wesen der Neuzeit aus.” “*Die Zeit des Weltbildes*” p.83. As Lovitt explains, he translates Heidegger’s *der Neuzeit* --more literally “New Age”-- as “modern age.” Heidegger’s questioning of the word “picture” (*Bild*) exemplifies that it does not mean copy (*Abbild*) or imitation (*Abklatsch*) and emphasizes instead the representedness (*Vorgestelltheit*) of the world: “Hence world picture, when understood essentially, does not mean a picture of the world but the world conceived and grasped as picture.” (129) “*Weltbild, wesentlich verstanden, meint daher nicht ein Bild von der Welt, sondern die Welt als Bild begriffen.*” (82)

³ René Descartes, *Meditations on First Philosophy with Selections and Objections and Replies*, trans. J. Cottingham (Cambridge: Cambridge University Press, 1986). Heidegger explicitly cites Descartes’ *Meditations*: “What it is to be is for the first time defined as the **objectiveness of representing**, and truth is first defined as the certainty of representing in the metaphysics of Descartes.” “Age of the World Picture”: 127. “*Erstmals wird das Seiende als Gegenständlichkeit des Vorstellens und die Wahrheit als Gewißheit des Vorstellens in der Metaphysik des Descartes bestimmt.*” “*Die Zeit des Weltbildes*”: 80. (my emphasis) The German word *Gegenständlichkeit* makes the meaning of the “standing outsideness” of representation more direct.

⁴“Age of the World Picture,” p. 132. “*Daß die Welt zum Bild wird, ist ein und derselbe Vorgang mit dem, daß der Mensch innerhalb des Seienden zum Subjectum wird.*” “*Die Zeit des Weltbildes*,” 85. In a long appendix on Descartes, Heidegger expands upon the relation between thought and representation: “Thinking is representing, setting-before, is a representing relation to what is represented.” P.149. This representation (*Vorstellung*)-- what we “set-before” (*vorstellen*) --is also structured by us.

“Age of the World Picture,” p. 134./ “*Die Zeit des Weltbildes*”: 84.

⁶ *Gebild*: as Lovitt points out, this is a Heideggerian neologism, with the overtones of a "structured picture." "Age of the World Picture," p. 134.

⁷ "Heidegger entitled his second Bremen lecture "Das Gestell." This lecture was again reworked into Heidegger's, now oft-cited and yet frequently misunderstood canonical text, "The Question Concerning Technology" in *The Question Concerning Technology and Other Essays*, translated by William Lovitt (New York: Harper and Row, 1977): 3-36. The German text to "Die Frage nach der Technik" appears in *Vorträge und Aufsätze* (Pfullingen: Günther Neske Verlag, 1954): 13-44. The essay is translated by Samuel Weber as "Questing After Technics." *Gestell* has been translated variously as "enframing" (Lovitt) and "emplacement" (Weber). See: Samuel Weber, "Upsetting the Set Up: Remarks on Heidegger's Questing After Technics," *Modern Language Notes MLN* 105, No. 5 (December 1989).

⁸ "The Age of the World Picture": 129.

⁹ Translations efface the verbal matrices and linguistic connotations implicit in Heidegger's German. For a discussion of the difficulties of translating Heidegger see: Samuel Weber, "Upsetting the Set Up: Remarks on Heidegger's Questing After Technics," *Modern Language Notes MLN* 105, No. 5 (December 1989): 977-991. *Das Gestell* is the nominalized form of the German verb *stellen* (to place, to frame, to trap) - a component of the matrix of verbs from the root *stellen* (to set, to place, to set into place) which are--with its relatives *bestellen* (to order, to command) *vorstellen* (to represent), *darstellen* (to present or exhibit) and *gestellen* (to place, to frame, to trap)--deployed by Heidegger to interrogate the metaphysical relationship between thought and representation. Heidegger makes the distinction between traditional/pre-industrial technics and modern technics by suggesting the historical shift from the German word *bestellen*--the peasant *bestellt* (tilled, worked but also cherished) the land --to *gestellen*. For the modern farmer, the land is *gestellt* (placed, trapped, framed). As Weber points out, *stellen* is an important spatializing verb. The Lovitt translation of *Gestell* as "Enframing" effaces the apparatical sense of the word and its mixture of movement and stasis; Lacoue-Labarthes translates *Gestell* as "installation," while Weber prefers "emplacement." In a footnote to the translated volume of Luce Irigaray's *L'oubli de l'air chex Martin Heidegger! The Forgetting of Air in Martin Heidegger*, translated by Mary Beth Mader (Austin: University of Texas Press, 1999): 183, Mader, the translator points out that the French translations of Heidegger's *Gestell* are, variously, *arrondissement* and *dispositif*. The French term *dispositif*--which also was used to describe the cinematic apparatus--indicates how *Gestell* connotes an apparatus with metapsychological and metaphysical effects.

¹⁰ See David Michael Levin, "Decline and Fall: Ocularcentrism in Heidegger's Reading of the History of Metaphysics" in David Michael Levin, ed. *Modernity and the Hegemony of Vision* (Berkeley: University of California Press, 1993): 186-215. Levin centers his analysis of Heidegger's critique of vision and its discourses to *Being and Time* (1927) and *Introduction to Metaphysics* (1935) rather than the later writings, "The Age of World Picture" (1938) and "The Question Concerning Technology" (1949-1955). See also "Das Ge-stell: The Empire of Everyday Seeing," in David Michael Levin, *The Opening of Vision: Nihilism and the Postmodern Situation* (New York: Routledge, 1988).

¹¹ "The Question Concerning Technology," 16. "Die Frage nach der Technik," 15.

¹² From Robert Smithson, "The Monuments of Passaic" *Artforum* 6 (December 1967): 49; quoted widely but not in relation to this passage of Heidegger's. See: Craig Owens, *Beyond Recognition: Representation, Power and Culture*, ed. Scott Bryson, Barbara Kruger, Lynne Tillman, and Jane Weinstock (Berkeley: University of California Press, 1992): 27; and Kaja Silverman, *The Threshold of the Visible World* (New York: Routledge, 1996).204.

¹³ Martin Heidegger, "The Turning," in *The Question Concerning Technology and Other Essays*, translated by William Lovitt (New York: Harper and Row, 1977): 48.

¹⁴ Martin Heidegger, "The Thing," trans. Albert Hofstadter in *Poetry, Language, Thought* (New York: Harper and Row, 1971): 165.

¹⁵ See Richard Dienst, "The Dangers of Being in a Televisual World: Heidegger and the Ontotechnological Question," in *Still Life in Real Time: Theory After Television* (Durham: Duke University Press, 1994):103-127. Dienst suggests that television has become the most disturbing version of enframing. (117)

¹⁶ This is a very different use of the term "frame" than deployed by Erving Goffman in *Frame Analysis* where "frame" refers to the organization of experience (social and natural). Erving Goffman, *Frame Analysis: An Essay on the Organization of Experience* (Cambridge, MA: Harvard University Press, 1974). Goffman's use of 'framing' is based on Gregory Bateson's "bracketing" in a piece "A Theory of Play and Phantasy" first published in *Psychiatric Research Reports* 2, American Psychiatric Association (December 1955) and reprinted in *Steps to an Ecology of Mind* (New York: Ballantine Books, 1972).