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Optical Instruments Used with Prints in the Eighteenth Century

Laura Pass Barry
College of William & Mary - Arts & Sciences

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OPTICAL INSTRUMENTS USED WITH PRINTS IN THE EIGHTEENTH CENTURY

A Thesis

Presented to

The Faculty of the Department of American Studies

The College of William and Mary in Virginia

In Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

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by

Laura Pass Barry
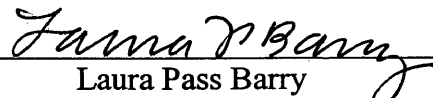
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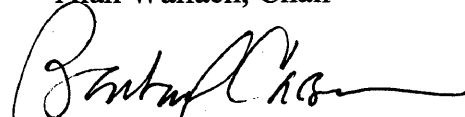
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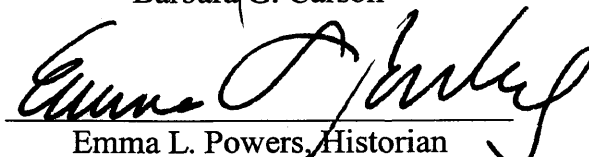Master of Arts

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Laura Pass Barry

Approved by the Committee, May 2004

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Alan Wallach, Chair

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Barbara G. Carson

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Emma L. Powers, Historian
Colonial Williamsburg Foundation

To Elizabeth Reid Barry and Dad

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ACKNOWLEDGMENTS

ABSTRACT

Viewing landscape prints entertained and amused men, women, and children alike. Known as perspective views, these engravings created an illusion of depth when examined through an optical device outfitted with a lens and mirror. Together, the prints and instruments offered an educational outlet, introducing the observer to foreign cities and exotic locations while satisfying curious minds and providing a subject for conversation. Although predominately a European pastime, Americans also enjoyed this diversion from the mid-eighteenth century through the early nineteenth.

The viewing device evolved from the camera obscura. Translated literally as "dark chamber," the camera obscura was a darkened room that received images from external scenes or objects through a small opening that allowed for light. First used by sixteenth-century scientists and philosophers for astronomical observations, over time, the form gained acceptance for use with prints by artists, draftsmen, and learned men. By the mid-eighteenth century, a variety of optical machines and perspective views were being manufactured and engraved to meet consumer demand.

The universal appeal of optical prints and viewing devices created widespread interest in these leisure pursuits that could be enjoyed at home or during performances by street entertainers and traveling showmen. Like optical instruments, perspective views remained popular throughout the nineteenth century.

OPTICAL INSTRUMENTS USED WITH PRINTS IN THE EIGHTEENTH CENTURY

INTRODUCTION

In the eighteenth century, there was a delicate balance between leisure activity and education. Enlightenment attitudes dictated ways to entertain oneself, not simply by doing, but through learning. As Barbara Maria Stafford states, "The lure of recreation was consonant with Locke's and Rousseau's sensationalist view that the sense organs had to be continuously exercised. This highly contemporary notion that play is fundamentally about activities with self-contained rewards is evident in the spate of publications claiming to be 'philosophical amusements' or 'easy and instructive recreations' for youth."[1]

Attainment of these pursuits depended upon free time: being able to enjoy the hours of the day without the constraints of responsibility limited such entertainment to the elite class. The definition of leisure and how it pertained to the eighteenth century is best explained by Stafford: "Leisure, as nonessential activity, temporarily plugged those gaping holes opening during the long day's journey into night. Spots of time not given over to gainful employment could profitably be filled with cultural pas-times."[2]

For the middling sort, however, participation in leisure activities required more than just having spare time. In order for social classes other than the elite to enjoy

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[1] Barbara Maria Stafford, <u>Artful Science: Enlightenment Entertainment and the Eclipse of Visual Education</u> (Cambridge, Mass., 1994), p. 55.
[2] Ibid., p. 33.

recreations, "the right to leisure had to lose its privileged status."[3] Barbara Carson writes, "Like ownership of fancy clothing, tablewares, and other consumer goods, it had to be something that ordinary people felt entitled to, if they could afford it."[4] She explains the historical significance of the colonists' reluctance toward purchasing products "traditionally considered inappropriate for their social class" and insists that acceptance of a new outlook is predicated on discarding older notions about the allocation of time and the ownership of leisure.[5]

By mid century attitudes about leisure changed.[6] A new privileged social group entered the scene ready to compete and participate in areas previously enjoyed only by the aristocratic elite. For the first time, parents spent large amounts of money on schooling, health, clothing, and entertainment. In their book, The Birth of a Consumer Society: The Commercialization of Eighteenth-Century England, Neil McKendrick, John Brewer, and J. H. Plumb state, "Middle-class children themselves became leisure objects in eighteenth-century England."[7] Parents were consumed with ensuring better futures for their children. Essential qualities included "sobriety, obedience, industry, thrift, benevolence, and compassion."[8] Acquiring these values not only provided an improved lifestyle for children, but also helped to elevate their social standing.

Men enjoyed outdoor sports, such as riding and hunting in addition to gambling and the arts. Women indulged in intellectual pursuits such as letter writing, reading,

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[3] Barbara G. Carson, "Early American Tourists and the Commercialization of Leisure," in Of Consuming Interests: The Style of Life in the Eighteenth Century, ed. Cary Carson, Ronald Hoffman, and Peter J. Albert (Charlottesville, Va., 1994), p. 375.

[4] Ibid.

[5] Ibid.

[6] The impact of the commercialization of leisure was most significant in England during the mid-eighteenth century; in the colonies, it was felt in the 3rd quarter and after the Revolution.

[7] Neil McKendrick, John Brewer, and J. H. Plumb, The Birth of a Consumer Society: The Commercialization of Eighteenth-Century England (Bloomington, Ind., 1982), p. 272.

[8] Ibid., pp. 290-291.

drawing, needlework, and music. While these gender-based diversions persisted throughout the eighteenth century, new amusements emerged to delight men, women, and children.

One such entertainment centered on science. McKendrick, Brewer, and Plumb write,

> The emphasis was on marvels, curiosities that were new and remarkable, and usually mechanical or optical; hence many children were given a keen sense of a new and developing and changing world in which mechanical ingenuity, electricity and science in general played an active part -- a totally different cultural atmosphere from that in which their grandfathers had lived.[9]

Interest in scientific experiments was not new. As early as the seventeenth century, Europeans residing in cities observed an increase in the production and consumption of technical toys. As Stafford indicates, these "mathematical recreations" included "conjuring tricks, amazing feats with coins, dice, and cards, 'experiments' with chemical and optical apparatus, mathematical puzzles, and 'ingenious' problems in hydrostatics and mechanics." Over time, they educated people who lived in both rural and urban areas.[10]

Today, it is possible to see the origins of modern forms of scientific and educational entertainments -- cameras, film, television, and computers -- in previous eras. While there were a multitude of prototypes for these pastimes during the eighteenth century, this paper focuses on the history and development of optical instruments that were used with perspective prints. Before modern forms of leisure, engravings of towns, cities, monuments, and buildings provided a way to educate and amuse society (fig. 1). They featured scenes of foreign locations from around the globe, giving visual access to

[9] Ibid., p. 307.
[10] Stafford, Artful Science, 33.

faraway places and to contemporary and historical events only read about or imagined. Although sometimes appreciated alone, these prints were often utilized with optical viewers containing a lens and mirror.

The precursor to the instrument and print was the camera obscura, a scientific device whose use evolved over time to include viewing landscape engravings. Other influences include the show box and various forms of traveling entertainments such as the peep show and magic lantern. While other optical amusements existed and were popular during the period, this thesis includes only those that related to or utilized prints.[11] Finally, because of the complexity and variety of terms associated with these instruments and prints, the most generic form of a word or phrase is used to prevent any misunderstandings.

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[11] See Richard D. Altick, The Shows of London (Cambridge, Mass., 1978), for a thorough discussion of the various types of public entertainments that he refers to as "exhibitions."

CHAPTER I

THE CAMERA OBSCURA

The optical principles of the camera obscura did not become widely known and

practiced until two thousand years after the first experiments of light in the fifth century

B.C.[12] Translated literally as "dark chamber," the camera obscura was a darkened room

with a pinhole opening that allowed light to enter (fig. 2). Images of external scenes or

objects could be transmitted inside. Leonardo da Vinci's observations from 1500 explain:

> When the images of objects which are illuminated penetrate through a small hole
> into a very dark room, these images are received in the inside of the room . . .
> some distance from the opening. You will see . . . all these objects in their proper
> form and colour. They will be reduced in size, [and] they will present themselves
> in a reversed position, owing to the intersection of the rays.[13]

The first forms of the camera obscura were life-size environments and were used

primarily for astronomical observations such as viewing and recording eclipses, sunspots,

and other celestial events. Also recognized as a drawing aid, the darkened room was used

by artists and draftsmen for civil and military purposes. In these instances, sheets of blank

paper were added to the interior walls of the chamber to permanently record exterior

views. Lenses and mirrors were sometimes added to sharpen the focus of the image and

counteract the reversed and inverted reflection.

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[12] Robert Hirsch suggests that the Chinese philosopher Mo Ti was the first to discover the properties of the camera obscura. Much has been written on the many scientists and learned men who experimented and observed the basic tenets of the camera obscura. However, their discoveries were not documented and published until the 15th century. See Robert Hirsch, Seizing the Light: The History of Photography (Boston, 2000), p. 3.

[13] In John Szarkowski, Photography Until Now (New York, 1989), p. 12.

Although scientists and philosophers documented and described the camera

obscura for centuries, the first illustration of the instrument was not published until

1544.[14] Modern-day scholars have argued over the sequence of discovery, use, and

publication of descriptions and images related to the device, and a multitude of

speculations abound. Whether or not this is the first illustration that shows a camera

obscura used for drawing is irrelevant; of interest is the fact that Giovanni Battista Porta

included the image in his book *Magiae Naturalis* (1558), an important and widely

distributed work on popular science during the sixteenth century.[15] Porta's decision to

include descriptions of a camera obscura among all the other scientific investigations is

important because it provides a context within which to examine the instrument and a

standard by which to judge it. Other published illustrations include a double camera (fig.

3).[16] Although life-size, this camera obscura was referred to as portable. The two

horizontal poles beneath the darkened chamber supported the device for transport. Once

in place, the operator(s) entered through the trapdoor beneath the cube to record the

images.

The camera obscura was not the first device to assist with drawing. Renaissance

artists such as Filippo Brunelleschi, Leon Battista Alberti, Leonardo da Vinci, and

Albrecht Dürer recognized a need for an instrument that would accurately record linear

projections. Scientific and mathematical interests of the fifteenth century brought new

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[14] For the most part, I will be wary of including such generalizations about who was the first person to do this and who was the last, etc. Scholars disagree over who should be credited with the discovery of each phenomenon. It is important to recognize that while experiments with the device had been going on for centuries, the first illustration of the camera obscura appeared only in 1544. Dutch physician and mathematician Reinerius Gemma-Frisius is credited with publishing a camera obscura used for viewing a solar eclipse. See Hirsch, Seizing the Light, p. 3.

[15] Helmut Gernsheim in collaboration with Alison Gernsheim, The History of Photography from the Earliest Use of the Camera Obscura in the Eleventh Century Up to 1914 (London, 1955), p. 5.

[16] Jesuit scholar and professor Athanasius Kircher illustrated a room-size camera obscura in his 1646 book Ars magna lucis et umbrae, in decem libros digesta.

thought and invention to machines that would aid in rendering perspective and

dimension. Martin Kemp explains:

> The science of geometrical optics corresponded in a real way to the central facts
> of the visual process. . . . geometrical procedures provided an appropriate means
> for the representation of three-dimensional objects on a flat surface in such a way
> that the projection presented essentially the same visual arrangement to the eye as
> that presented by the original objects.[17]

Most likely, the best-known application of a drawing machine was by Brunelleschi. In

1418, he used the optical instrument to render a design in perspective of the dome of

Santa Maria del Fiore in Florence.[18]

Experimentation and use of the camera obscura in scientific and mathematical

equations increased in the seventeenth century. The invention and use of the telescope

and microscope revived interest in the capabilities of optical instruments.

Developments in shape and materials rendered the camera obscura more useful.

Lenses eventually replaced the pinholes and mirrors were added. Both improvements

sharpened the focal quality and guided the direction of the reflected image. Smaller

models reduced the landscape to a more manageable size for copying and enabled artists,

draftsmen, and architects to transport portable camera obscuras into the field.

Probably the most notable of these devices was the camera obscura constructed in

the form of a tent. First used by astronomer Johann Kepler in 1611, Sir Henry Wooten

described the instrument in a letter to Sir Francis Bacon:

> I was much taken with the draught of a Landskip on a piece of paper, methoughts
> masterly done: Whereof enquiring the Author [Keplar], he bewrayed with a smile
> it was himself, adding he had done it *non tanquam Pictor sed tanquam
> Mathematicus* [not as a painter but as a mathematician]. . . . He hath a little black

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[17] Martin Kemp, The Science of Art: Optical Themes in Western Art from Brunelleschi to Seurat
(New Haven, Conn., 1990), p. 165.

[18] See Ross King, Brunelleschi's Dome: How a Renaissance Genius Reinvented Architecture
(New York, 2000), for more information.

tent . . . which he can suddenly set up where he will in a field, . . . [It is] exactly close and dark save one hole, about an inch and half in Diameter, to which he applies a long perspective-trunke, with the convex glass fitted to the said hole, and the concave taken out at the other end, which extendeth to about the middle of this erected Tent, . . . the visible radiations of all the objects without are intromitted, falling upon a paper, . . . he traceth them with his Pen in their natural appearance, turning his little Tent round by degrees till he hath designed the whole aspect of the field: . . . I think there might be good use made of it for Chorography [topographical drawings]: . . . surely no Painter can do them so precisely.[19]

Other forms of the camera obscura included a portable version by Robert Hooke. Sometimes described as a "Perspective Box," this instrument was promoted in seventeenth-century books as a device which helped to illustrate appearances through the human eye accurately.[20] Johann Zahn's reflex box camera obscura of roughly the same time was also widely published.

The most interesting camera obscuras are those disguised in other forms, like the versions incorporated into sedan chairs. These adaptable shapes were designed for transportability.[21] Miniature cameras could be inserted in nearly any object of everyday use. For example, camera obscuras are known to have been placed in walking canes and drinking goblets. The latter were widely espoused by French mathematician Pierre Herigone. He described the device as a useful way to keep watch over guests in *Supplementum Cursus Mathematici* (1642). Similar to other camera obscura forms, the drinking goblet contained an aperture, convex lens, and mirror in the stem of the glass. Rays of light entered through the pinhole and reflected off of the lens and mirror, projecting an image toward the wine in the glass. German schoolmaster J. C. Kolhans

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[19] Cited in Gernsheim, History of Photography, pp. 9-10. Original quote from an artists' manual by William Sanderson, Graphice, the Use of Pen and Pencil, or the most excellent Art of Painting (London, 1658), p. 86. Szardowski, Photography Until Now, p. 13. Szardowski provides a translation of the Latin phrase, "non tanquam Pictor sed tanquam Mathematicus."

[20] 'From today painting is dead' The Beginnings of Photography (London, 1972), p. 18.

[21] John H. Hammond cites W. J. s'Gravesande's An Essay on Perspective, 1711, as a period source for more information. John H. Hammond, The Camera Obscura: A Chronicle (Bristol, 1981), p. 86.

advocated the use of the camera obscura in the form of a book. Kohlhans purportedly disguised his instrument to look like a textbook and used the device to keep an eye on his students.[22]

Other unusual designs included table cameras such as Georg Brander's rococo table model or M. Guyot's version in the form of a desk from 1770.[23] In his book, *Rational Recreations* (1783), William Hooper incorporated an illustration of Guyot's version. The mechanics of this device were built underneath the table top and in between the table legs. He described the use of the portable camera obscura: "The great pleasure produced by the camera obscura in the common form, has excited several to render it more universally useful by making it portable; easily fixed on any spot, and adapted to every prospect."[24]

Hooper discussed other specific forms of the optical instrument and provided graphics and accompanying text. Under the general heading of camera obscura, he hailed the use of the device, commenting on its popularity:

> We shall here give a short description of this optical invention; for it is very common, it is also very pleasing, and though almost everyone has seen it, every one knows not how to construct it. . . . Nothing can be more pleasing than this Recreation, especially when the objects are strongly enlightened by the sun: and not only land prospects, but a sea-port, when the water is somewhat agitated, or at the setting of the sun, presents a very delightful appearance. This representation affords the most perfect model for painters.[25]

The use of the camera obscura by artists was not new. Extensive studies on Jan Vermeer and Canaletto (Giovanni Antonio Canal) demonstrate that the two painters

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[22] Gernsheim, History of Photography, p. 12.

[23] 'From today painting is dead,' p. 19. This source suggests that the Guyot desk was also illustrated in Guyot's Nouvelles recreations physiques et mathematiques, 1770.

[24] William Hooper, Rational Recreations, in which the principles of numbers and natural philosophy are clearly and copiously elucidated, by a series of easy, entertaining, interesting experiments. Among which are all those commonly performed with the cards. 2nd ed. (London, 1783), p. 28.

[25] Ibid., pp. 23-24.

utilized the instrument to record their scenes or views more accurately.[26] Brothers

Thomas and Paul Sandby were said to have used it in their renderings of the English

countryside. Artists working with Josiah Wedgwood employed the camera obscura as an

aid in drawing views of English country houses and estates, sketches of which were later

used to ornament a service of china for Catherine the Great. In 1773, Wedgwood wrote,

"I wish you could send me a good camera obscura, not too cumbersome, that I could take

to the gentlemen's seats here."[27] When it was time to tally his expenses for the project, he

included the cost of drafting pictures: "I will name some of these extra expenses, though

they must occur to you without it. Taking original views, copying Pictures & Drawings,

Buying Books & Prints to a large amount."[28]

A rising middle class in the eighteenth century created a renewed interest in the

camera obscura as a device that produced inexpensive portraiture.[29] Instruments for

tracing images were redeveloped and introduced to the market. Advertised as drawing

aids, camera obscuras provided technical support to artists and practical assistance to

amateurs. Georg Brander's rococo table camera was useful in this way. Brander wrote

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[26] See Daniel A. Fink, "Vermeer's Use of the Camera Obscura—A Comparative Study," The Art Bulletin 53, no. 4 (December 1971), and Charles Seymour, Jr., "Dark Chamber and Light-Filled Room: Vermeer and the Camera Obscura," in Seventeenth Century Art in Flanders and Holland, vol. 9 of Garland Library of the History of Art (New York, 1976). Several books have recently been published on this theory, including Tracey Chevalier's Girl with a Pearl Earring, (New York: HarperCollins, 2000), a popular treatment, and David Hockney's Secret Knowledge: Rediscovering the Lost Techniques of the Old Masters, (New York: Viking Press, 2001). See also Lawrence Weschler, "The Looking Glass," The New Yorker (January 2000), an article that first advanced Hockney's belief that much artwork of the Renaissance was aided by the camera obscura.

[27] Cited in Eliza Meteyard, The Life of Josiah Wedgwood from His Private Correspondence and Family Papers . . . , vol. 2 (London, 1866), p. 283.

[28] Ibid., p. 301.

[29] Kemp, Science of Art, p. 186.

several books on the application of the camera obscura as an instrument for enlarging

drawings.[30]

In 1778, London instrument maker William Storer developed a sophisticated

camera obscura for sketching portraits. Called the "Royal Accurate Delineator," the

instrument was considered the most advanced form of its time because it used several

lenses. Storer's lens system helped to enhance the details of the image and create a bright,

well-lit view of the subject.[31] Horace Walpole described this improved model in a letter

to the Reverend William Mason dated September 21, 1777:

> I forgot to mention . . . a new discovery that charms me . . . [it] will bring all
> paradise before your eyes. . . . It will be the delight of your solitude, . . . It is such
> a perfecting of the camera obscura, that it no longer depends on the sun, and
> serves for taking portraits with a force and exactness incredible; . . . It is called *the*
> *delineator.* . . Sir Joshua Reynolds and West are gone mad with it, and it will be
> their own faults if they do not excel Rubens in light and shade, and all the Flemish
> masters in truth.[32]

Walpole continued, "Mr. Storer fell as much in love with Strawberry Hill

[Walpole's home] as I did with his instrument. The perspectives of the house, which I

studied so much, are miraculous in this camera. The Gallery, Cabinet, Round Drawing

Room, and Great Bed Chamber, make such pictures as you never saw." He closed with

an endorsement that the new and improved device will "enable engravers to copy pictures

with the utmost precision," writing, "I think it will perform more wonders than electricity

. . . I am sure you will not go back without one."[33] Other camera obscuras were designed

for copying artwork. Nicolai Bion's 1727 model was visually similar to copy-stands used

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[30] Hermann Hecht, Pre-Cinema History: An Encyclopedia and Annotated Bibliography of the Moving Image Before 1896, ed. Ann Hecht (London, 1993), entries 76A, 77C, 77C1, 85B.
    [31] Hammond, Camera Obscura, pp. 78-79.
    [32] Horace Walpole, Selected Letters, selected and arranged by William Hadley, reprint ed. (London, 1967), pp. 524-525.
    [33] Ibid., p. 525; I find it interesting that the camera obscura was used in the viewing and sketching of interior rooms. Most sources describe its role as merely with exterior scenes.

for photography today, except that it operated in the dark and utilized a mirror to reflect sunlight onto the image to be reproduced.[34]

According to Jonathan Crary, the intended function of the camera obscura was not drawing. He cites a 1753 entry in John Harris's *Encyclopédie* that emphasizes the use of the instrument for education and entertainment. Crary comments, "There is often a presumption that artists were making do with an adequate substitute for what they really wanted, and which would soon appear -- that is, a photographic camera. Such an emphasis imposes a set of twentieth-century assumptions . . . onto a device whose primary function was *not* to generate pictures."[35] He supported Harris's encyclopedia entry: "Only belatedly does it note that 'by means of this instrument someone who does not know how to draw is able nevertheless to draw with extreme accuracy.' "[36]

As shown by the foregoing examples, the seventeenth and eighteenth centuries marked the pinnacle of design and use of the camera obscura. By the mid-eighteenth century, the earlier functions of the camera obscura as a scientific, documenting, and drawing aid were coupled with a new emphasis on the device as an entertainment and educational tool. Crary writes that it "was without question the most widely used model for explaining human vision."[37] Public demonstrations promoted the device as amusement. An August 2, 1744, advertisement in the *Pennsylvania Gazette* reads:

> Just arrived from LONDON, For the Entertainment of the Curious and Others, And is now to be SEEN, by Six or more, in a large commodius Room, at the House of Mr. Videll, in Second Street: . . . The Clock and Camera Obscura, with the Battle of Dettingen, and several Italian Landskips, representing Armies, both

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[34] Hammond, Camera Obscura, p. 73. Hammond illustrates Bion's device and notes, "Although the engraver has correctly depicted the reversal of the copy, he has mistakenly omitted to invert it."

[35] Jonathan Crary, Techniques of the Observer: On Modern Vision and Modernity in the Nineteenth Century (Cambridge, Mass., 1990), p. 32.

[36] John Harris, Encyclopédie ou dictionnaire des sciences, des arts et des métiers, vol. 3 (Paris, 1753), pp. 62-64, quoted in Crary, Techniques of the Observer, p. 33.

[37] Ibid., p. 27.

> Horse and Foot, going through their Exercise at the Word of Command: Likewise Views of Ships fighting at Sea, with the Fish playing above Water, and Variety of Country Dances by figures, six or eight Foot high, . . . This Curiosity is esteemed one of the best Pieces of the Kind that ever was brought from Italy. Fore Seat 18d. Second Seat 12d. Third 6d.[38]

The unknown traveling showman placed several more advertisements in the newspaper that summer, the last of which read, "My Stay being only this Week," as if to inspire a sense of urgency among his readers.[39]

There is no doubt the heightened interest in scientific inquiry and popular science fostered this trend toward optical amusements. During the Enlightenment, reason was the supreme guide in humanistic affairs. It was applied to the study of nature, where scientific experiments were thought to reveal truths no longer reached through religion. Enlightened minds also obtained these absolutes through self-improvement found by way of knowledge and a proper education, both of which served as aids to social advancement. A new social rank with increasing leisure time and money sought to improve their status by emulating the lifestyle, appearances, and interests of the wealthy and thus created a market for educational material. In 1789, James Keir wrote:

> The diffusion of a general knowledge, and of a taste for science, over all classes of men, in every nation of Europe, or of European origin, seems to be the characteristic feature of the present age . . . in no former age, was ever the light of knowledge so extended, and so generally diffused. Knowledge is not now confined to public schools, or to particular classes of men.[40]

Books that popularized the capabilities of scientific instruments advanced the trend, spreading the interest in popular science "down the social scale" from the very top

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[38] Pennsylvania Gazette, Aug. 2, 1744, in Pennsylvania Gazette, Folio I (1728-1750), CDRom.
[39] Ibid., Aug. 23, 1744.
[40] J. K. [James Keir], The First Part of a Dictionary of Chemistry, &c. (Birmingham, Eng., 1789), p. 3, quoted in Gerald L'E. Turner, Scientific Instruments and Experimental Philosophy, 1550-1850, (Hampshire, Eng., 1990), p. 382.

to the middle-class patron.[41] Perhaps this is one reason why John Locke and Sir Isaac

Newton included references to experiments with the camera obscura in their works *Essay*

on Human Understanding and *Opticks*.[42] Crary writes, "What they [both books] jointly

demonstrate is how the camera obscura was a model simultaneously for the observation

of empirical phenomena *and* for reflective introspection and self-observation."[43]

References to the camera obscura also appear in literary texts, well-known works

of popular entertainment, and personal writings. English poet Joseph Addison described

in the *Spectator* the aesthetic effects of a vision he saw through the device: "The prettiest

Landskip I ever saw, was one drawn on the Walls of a dark Room, which stood opposite

on one side to a navigable River, and on the other to a Park."[44] Similarly, in 1725,

Alexander Pope described his experience of viewing scenes from a grotto he built:

"When you shut the Doors of this Grotto, it becomes on the instant, from a luminous

Room, a *Camera obscura*; on the Walls of which all the objects of the River, Hills,

Woods, and Boats, are forming a moving Picture in their visible Radiations."[45]

In 1747, an anonymous British poet described "the Sight of a Chamera Obscura"

in verse:

> Come; lead us to thy Chamber; there unfold
> Thy secret Charms, delightful to behold;
> How little is thy Cell? How dark the Room?
> Disclose thine Eye-lid, and dispel this Gloom!
> That radiant Orb reveal'd, smooth, pure, polite;
> In darts a sudden Blaze of beaming Light,
> And stains the clear white Sheet, with Colours strong and bright;

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[41] Ibid., p. 380.

[42] Crary, Techniques of the Observer, p. 40.

[43] Ibid., p. 40.

[44] Cited in Marjorie Nicolson and G. S. Rousseau, 'This Long Disease, My Life': Alexander Pope and the Sciences (Princeton: N. J., 1968), p. 283. Addison's article was titled "Pleasures of the Imagination."

[45] Ibid., pp. 284-285. Some authors dispute whether Pope actually built the camera obscura or was seeing its effects through an opening in the door to the cave.

> Exterior Objects painting on the Scroll,
> True as the Eye presents 'em to the Soul;
> A New Creation! deckt with ev'ry Grace!
> Form'd by thy Pencil in a Moment's Space!
> As in a Nutshell, curious to behold;
> Great *Homers' Iliad* was inscrib'd of old;
> So the wide World's vast Volume, here, we see
> To Miniature reduc'd, and just Epitome.[46]

In addition to popular books and magazines, written accounts, inventories, and newspapers of the period also suggest the widespread use of the camera obscura by learned men. Among the goods and effects sold to Virginian Robert Carter after the death of royal governor Francis Fauquier was "1 Camera Obscura" worth £2 5s.[47] Thomas Jefferson borrowed a camera obscura from instrument maker David Rittenhouse in 1793. He hoped to assist two young ladies in taking "a few lessons from nature." Jefferson wrote, "Time hangs heavily on their hands, & the more so, as their drawings master cannot attend them."[48] The device must have impressed him because Jefferson later purchased it.

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[46] Ibid.

[47] Inventory of the Estate of Francis Fauquier, July 20, 1771, p. 18, available from www.pastportal.com.

[48] Silvio A. Bedini, Thomas Jefferson: Statesman of Science (New York, 1990), p. 247.

CHAPTER II

SHOW BOXES, PEEP SHOWS, AND MAGIC LANTERNS

In the eighteenth century, men of wealth and power collected objects related to intellectual pursuits. The trend had started in the late sixteenth century when learned men amassed collections of books, works of art, and antiquities for the purpose of "self-advertisement, economic advancement and utility, and intellectual satisfaction."[49] Interest in philosophical experiments, fostered by the scientific climate of the period, promoted the inclusion of optical instruments in their holdings.

Excitement about new inventions and collections encouraged the establishment of small intellectual interest groups. The primary goal of these societies was to promote scientific study and analysis. Gerald L'E. Turner writes, "Many of these cabinets were maintained and augmented into the eighteenth century, and others were formed by learned societies, and as an aid to both institutionalized and private teaching."[50] This was accomplished in part through public demonstrations. The most popular form combined lecture and experiment. The first was held at the University of Leiden in 1675 for a class in experimental physics.[51] Although these early educational forums were limited to an elite clientele strictly interested in science, the popularity of such gatherings soon attracted more general audiences. Stafford comments, "Unskilled laborers and

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[49] Turner, Scientific Instruments, p. 214.
[50] Ibid., p. 220.
[51] Ibid., p. 378.

peasants . . . generally lacked the means and the interest to enter secondary schools. And, until much later in the century, they also lacked the English coffeehouse 'penny universities' whose popular lectures were audited by printers, drapers, and weavers. . . . The largest portion of the populace, then, was 'educated' through popular spectacles."[52]

The earliest form of educational and scientific amusement may be the show box. Architect Leon Battista Alberti was the first to demonstrate an instrument that "reduce[d] the more or less empiric knowledge of perspective to a scientific system."[53] As early as 1437, he is said to have invented perspective prints for a show box. The device was used for viewing images of nature in perspective and is often confused with the camera obscura. Instead, Alberti's instrument was merely a machine that featured transparent paintings of "day and night scenes, such as the moon rising over rocks and mountains."[54]

Sometimes referred to as "Dutch perspective boxes," seventeenth-century forms of the show box are described as tall wooden boxes with a deep triangular back. Each device had a small opening in the exterior for looking inside. The interior of the contraption was composed of a series of miniature rooms outfitted with painted representations of architecture and furnishings. Although seemingly straightforward, the construction included covering all six planes of the box with anamorphic designs and incorporating artistic techniques such as linear perspective, trompe l'oeil, and other optical effects to create a three-dimensional view. Stafford comments,

> When glimpsed through the eyehole, complex internal decorations visually detach
> themselves from the distinctive geometry of their material surroundings, as the

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[52] Stafford, Artful Science, p. 226.

[53] Wolfgang Born, "Early Peep-Shows and the Renaissance Stage—II," The Connoisseur 107, no. 476 (May 1941), p. 161.

[54] Gernsheim, History of Photography, pp. 3-4. Scholars have long thought that Alberti invented the camera obscura. Gernsheim believes the misattribution stems from a misleading entry in Vasari's Lives of the Painters.

chest's cryptic and vortical lining is metamorphosed into *illusions* of lucid, life-size, free-standing architecture.[55]

The creation of these boxes can be attributed to the Dutch interest in optics and perspective. Art historian Edgar P. Richardson writes, "Perspective boxes are obviously a part of the taste for such illusory effects. But they are related also to a much more important development of Dutch art, the new conception of space which entered Dutch painting with the rise of the Delft school in the 1650s."[56] The best-known creator of the show box was Samuel van Hoogstraeten. Ironically, only three extant examples of his work survive. Arnold Houbraken, a student of Hoogstaeten, stated, "He painted mostly portraits, historical pictures and pictures in perspective, which latter one looked at through a hole in the wall. I saw several of them. Within a small space they represent an entire palace with arches and galleries supported on marble columns."[57] A pupil of Rembrant, Hoogstraeten was interested in the optical and illusionist capabilities of the show box rather than its scientific potential.[58] In his chapter on perspective in *Inleyding*, Hoogstraeten claimed, "With a knowledge of this science one can construct the wonderful peep show."[59]

The concept of a viewing box must have been of great interest in the seventeenth and eighteenth centuries. In a letter to the editor of the *Gentleman's Magazine* of April 1753, S. Parrat of Westmoreland, England, wrote about construction of a dual functioning instrument that also worked as a camera obscura:

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[55] Barbara Maria Stafford and Frances Terpek, <u>Devices of Wonder: From the World in a Box to Images on a Screen</u> (Los Angeles, Cal., 2001), p. 107.

[56] Edgar P. Richardson, "Samuel van Hoogstraten and Carel Fabritius," <u>Art in America</u> 25, no. 4 (October 1937), p. 144.

[57] Karl G. Hultén, "A Peep Show by Carel Fabritius," <u>The Art Quarterly</u> 15, no. 4 (winter 1952), p. 281.

[58] Ibid., p. 282.

[59] Cited in Ibid., p. 281. The quote is from 1678.

[I am] bold to trouble you with the following improvement of an optick machine for viewing perspectives in, which is very easily constructed as follows: . . . Elevate the end CD a little, and look through the glass with both eyes (which is a great advantage) and you will see the picture, at a vast distance, surprisingly magnified; and also with such a beautiful clearness as can hardly be express'd.[60]

He continued,

There is another advantage in this contrivance, for black it on the inside, and take the paper away from the lid, and fix it up-right against the end AB, then you will have a portable Camera Obscura, directing the end CD to any object as buildings; men, trees &c the sun shining bright, they will be represented on the paper with such exquisite exactness as far as surpasses the utmost skill of any painter to express.[61]

Thomas Gainsborough used a viewing box for landscapes, preparing a dozen or so transparent paintings on glass specifically for the show. Gainsborough's instrument differed from others in that it included additional lighting from candles and a silk screen to distribute the light.[62]

A similar form to the show box is the peep show. In modern society, the term "peep show" has become synonymous with risqué entertainment.[63] Images of x-rated dance clubs and showgirls are inextricably linked to the phrase. Prying individuals are called "Peeping Toms," an expression coined after the legendary tale of a tradesman named Tom, who was blinded upon gazing at Lady Godiva riding naked on her horse. Historically, however, a peep show was nothing more than a scene or an object viewed through a small opening in a box or room. Today, the term can be used broadly to describe any number of visual amusements that encouraged one to "peep," or look.

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[60] S. Parrat, "[Letter to the Editor]," The Gentleman's Magazine: and Historical Chronicle 23 (April 1753), p. 171.

[61] Ibid., p. 171.

[62] Gernsheim, History of Photography, p. 4.

[63] Godiva rode naked through the town of Coventry, Eng., to persuade her husband, the Earl of Mercia, to stop taxing the local peasants. The myth suggests that while the townspeople obeyed a request to shutter their windows as Lady Godiva rode past, a tradesman named Tom looked at her and was struck blind. See Encyclopedia Britannica, 13th ed., s.v. "Lady Godiva."

The earliest versions of the peep show date to the Renaissance. They served dual

purposes as "a time-keeper and a peep-show housed together in a rectangular box, into

the front of which the clock face is built."[64] Both the interior and exterior were highly

decorated. Painted scenes on the inside replicated classical and mythical pageants. A

mirror attached underneath the lid was used to enhance the view. Sixteenth- and

seventeenth-century versions were based on the theater. By the late seventeenth century,

the pictures replicated everyday life.[65]

The traveling raree show, which delighted viewers for more than one hundred and

fifty years, was a popular version of the peep show.[66] For a modest sum, one could peer

through a small hole into the peep show box and see a panorama or exhibition of painted

and printed pictures. The operator showed a variety of scenes one after another by pulling

a string or winding a crank on the outside of the box that rotated the prints into position.[67]

Images in the show were often enlarged with a magnifying lens and were reflected from

the bottom of the box by a mirror tilted at an angle of 45 degrees.

There were two kinds of peep shows during the eighteenth century, the caravan

show and the back show. Caravans drawn by a horse or donkey journeyed mainly

through the countryside. The most expensive caravans were mahogany and showcased

gilt-carved moldings and scenes hand-painted by skilled artists. Modest versions often

did not have lenses, only a hole in the side of the frame of the box. Every caravan act

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[64] Wolfgang Born, "Early Peep-Shows and the Renaissance Stage—I," Art in America 25, no. 4 (October 1937), p. 67.

[65] Ibid., II, p. 164.

[66] The term "raree-show" was used for a traveling peep show as early as 1681. Oxford English Dictionary, s.v. "Raree-show."

[67] Bericht uber Wallbergen's Sammlung natürlicher Zauberkünste, 1754, includes construction details on "one of earliest arrangements for mechanically changing pictures in the peep-show." The box has "two wooden rollers on which the band of separate but linked engravings are wound, to be exhibited by being rolled from one roller to another." See Hecht, Pre-Cinema History, entry 71B.

included a curtain to prevent those who did not pay from watching the presentation.

Eighteenth-century satirist William Hogarth illustrated a peep show of this variety in the

right foreground of *Southwark Fair,* a print that depicts a street scene from the well-

known Lady Fair in London (fig. 4). Held every September, the gathering was a place of

amusement where acrobatics, puppetry, and musical performances were presented.

Hogarth referred to this engraving as "The Humours of the Fair," undoubtedly a comment

on the vice and rioting that began to take over the market and eventually forced its

closure in 1762.

The back show was a smaller, more versatile form of peep show that the

showman literally strapped on his back and carried from fair to fair, standing the box on

portable trestles. Subjects included historical and religious scenes such as Napoleon at the

battle of Waterloo, the coronation of William IV, the building of the tower of Babel, and

Daniel in the lion's den. Other acts were based on contemporary theatrical performances.

In addition to exhibiting prints and paintings, traveling showmen called Savoyards

featured magic lantern shows, puppetry, musical acts, and other entertainments (fig. 5).[68]

During 1748-1749, John Bonnin performed peep shows in colonial New York.[69]

He exhibited perspective views of France with his Philosophical Optical Machine,

declaring that after each showing "instead of the common Chat, there is nothing scarce

mentioned now, but the most entertaining Parts of Europe."[70] Of his performance, he

said, "In short, there's nobody [that] can set up the least face for politeness and

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[68] In the eighteenth century, the word "Savoyard" referred to an itinerant musician from Savoy, France. Today, it commonly refers to any traveling showman. OED, s.v. "Savoyard."

[69] F. W., "Peep-Show Prints," Bulletin of the New-York Public Library 25, no. 6 (June 1921), p. 364.

[70] Richard L. Bushman, The Refinement of America: Persons, Houses, Cities (New York, 1992), p. 86.

conversation without having been with Mr. Bonnin; and embellishing their discourse with making judicious and elaborate observations and criticisms on this, that, and the other building, improvement, or dress."[71]

The art of small talk became important in the eighteenth century and people searched for pleasant subjects to discuss with their friends and neighbors. In his book *Principles of Politeness,* the Earl of Chesterfield offered the following advice to "every young gentleman": "There is a certain distinguishing diction that marks the man of fashion, a certain language that every gentleman should be master of. . . . [This] fashionable kind of small-talk which however trifling it many be thought, has its use in mixed companies: of course, you should endeavour to acquire it. By small-talk I mean a good deal to say on unimportant matters; for example, foods, the flavour and growth of wines, and the chit-chat of the day."[72] Like anything else, this code of refinement was dictated by the elite class, but imitated by the middle and lower classes. Viewing show box and peep show performances quite possibly could have been yet another way in which to attain, or attempt to attain, civility.

The widespread appeal of the peep show was due largely to the mystery of viewing the unknown. In fact, luring näive observers into purchasing a peek into the box was a traveling showman's intention. Johann Heinrich Zedler's *Grosses Universal Lexicon aller Kunste und Wissenchaften,* 1732-1750, cites examples of the banter that showmen would typically shout to passersby -- "Schöne Raritat! Schöne Spielwerck!" which translates as "Beautiful raree-show! Beautiful play-thing!"[73]

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[71] Ibid., p. 86.
[72] Philip Stanhope, Earl of Chesterfield, with additions by The Reverend Dr. John Trusler, Principles of Politeness, and of Knowing the World (London, 1775), pp. 35-36.
[73] Hecht, Pre-Cinema History, entry 59.

Excitement was further heightened by the way in which the image was displayed

-- and thus perceived -- in the peep box. Hultén writes,

> Looking at an image through a hole, the power of illusion is also increased by the apparent lack of boundaries, the little area which is defined by the motions of the eye has the same character of unlimited possibilities of extension to the sides as our ordinary area of vision, the picture apparently lacks that limitation towards the sides which we are accustomed to expect in pictures.[74]

E. H. Gombrich adds, "Psychology has taken over the investigation of illusion with

scientific precision."[75] To explain, he constructed a peep show with three viewing holes.

In the box, he included illustrations of three separate chairs. When viewed from the same

angle, each image looked the same. But when analyzed from another point of view, the

observer discovered that only one of the images was in fact a realistic portrayal of a chair;

the other two were merely illusions. Gombrich's point in devising the experiment was to

explain that as observers, we tend to only see the things that we want to see, rather than

what is really in front of us. The intended view is colored by our subconsciousness as we

examine it. Our minds form abstract images into known quantities.[76]

Whether for personal pleasure or public show, the function of the peep show and

show box must have been well understood by eighteenth-century society. References to

the wide variety of peep shows appear in print catalogs, newspaper advertisements, and

inventories of the period. Peep shows were also featured in numerous printed materials,

among them the *Westminster Magazine*, which included a satirical print that conveyed

political concerns of the day (fig. 6). In the illustration, a showman comments on a

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[74] Hultén, "Peep Show," pp. 286-287.

[75] E. H. Gombrich, Art and Illusion: A Study in the Psychology of Pictorial Representation (New York, 1961), pp. 247-248.

[76] Ibid., p. 249.

panorama of pictures, presumably from inside a show box, to a young boy. The subject

was the British government and the many problems it faced in 1779.

Yet another example of educational entertainment was the magic lantern

(fig. 7). While best known as a nineteenth-century recreational form, the origin of the

magic lantern dates back to the seventeenth century.[77] It was the precursor of the modern

film projector, showcasing slides that depicted historical, religious, literary, and scientific

subjects. The main parts of the device were a light source, a transparency, and a lens

through which to focus. Similar to the camera obscura, which was said to be used in part

for "exploiting natural phenomena to astonish and entertain the spectator," the magic

lantern had two purposes: that of an instrument of science and that of an object of

entertainment.[78]

The magic lantern functioned by casting an image of its subject onto an exterior

surface (fig. 8). Its process was fairly simple; operators pulled the slides, set into a groove

alongside the machine, across the lens of the lantern. Light from an oil lamp within the

device was directed through the lens and image, thus projecting a picture onto a wall or

screen.

Early slides were hand drawn or painted and set within large wooden frames. By

the nineteenth century, more common versions were mounted in paper. They were

produced by the lithographic process, which transferred the image onto glass. While

some slides formed continuous, multiple images, others illustrated individual scenes.

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[77] Robert Hooke and Francesco Eschinardi both included details of the instrument in their books from 1668. Hecht, Pre-Cinema History, entry 23. Athanasius Kircher described the magic lantern in the second edition of Ars Magna (1671). Ibid., entry 25. Although these publications did not cite the use or construction of the device, they were among the first to document its existence.

[78] Kemp, Science of Art, p. 191. Kemp actually argues that the camera obscura was used more so for magic than artistic endeavors. See also Stafford and Terpek, Devices of Wonder, p. 298.

Subjects ranged from foreign travel and American history to biblical and children's

stories. Mass-produced photographic slides took over the glass slide market after about

1860.

The magic lantern was one form of amusement whose audience changed over

time. It began as an adult recreation. Books from the period, such as della Porta's *Magiae*

Naturalis, document how traveling showmen used the device to scare audiences. The

work describes how the instrument can be used to conjure ghosts and other artificial

beings by manipulating the intended view. Because the operational techniques behind the

projection of these images were kept fairly secret and scared viewers, magic lanterns

were originally confined to adult viewing.

Technological innovations in artificial light enhanced the capabilities of the magic

lantern, making it appropriate for large audiences.[79] Showmen took full advantage of this

and utilized the machine to produce horror shows called phantasmagorias. "The

phantasmagoria was an advanced magic lantern that created rear-screen image

projections of ghosts, skeletons, and celebrities in a semidarkened theatre," Robert Hirsch

explains.[80] Operators placed the device on a track behind a screen which guided the

movement of the magic lantern: "By moving the projector backwards and forwards he

[the operator] could rapidly alter the size of the images on the screen, much like a modern

zoom lens."[81]

The most noteworthy of these presentations was by Etienne Gaspard Robertson,

who added special effects like thunder, lightening, smoke, and glass harmonica music to

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[79] The Argand Oil Lamp, considered the first modern lighting system, was developed in 1784; the Drummond Light, or limelight, was invented in 1826. See Hirsch, Seizing the Light, p. 9.
[80] Ibid.
[81] History of the Magic Lantern, Part 5, available from www.magiclantern.org.uk.

his performances. Frances Terpek describes a typical setting: "The repertoire of images in Robertson's *Fantasmagorie* included the three witches appearing to Macbeth, the head of Medusa, a bloody nun, the tomb of the recently executed French king Louis XVI, the temptation of St. Anthony, the opening of Pandora's box, and the ghost of the abbess Héloïse."[82]

As the mechanics behind the magic lantern were gradually understood and accepted by society, the device became suitable for children. Toy manufacturers began to produce cheaper lanterns specifically for youth. The first toy magic lantern was made in 1843 by Parisian tinsmith Auguste Lapierre.[83] It enabled young viewers to enjoy educational subjects in an alternative way within the home, perhaps even alongside their parents' more sophisticated adult model. Children and adults could also view magic lantern demonstrations performed by professional showmen. In the eighteenth century, colonial American newspapers included advertisements for public performances. On September 8, 1746, an announcement in the *New-York Evening Post* read, "also to be Seen, the Curious and Surprizing Magick Lanthorn, By which Friar Bacon, Doctor Faustus, and others, perform such wonderful Curiosities, representing upwards of 30 humourous and entertaining Figures, larger than Men or Women."[84] In 1767, an advertisement for the *New-York Mercury* noted:

> Henry Hymes . . . will perform To-morrow Evening, . . . First, he balances a Ladder with four chairs on it, upon his Chin; . . . Second, He raises an Iron Bar 35 lb. Weight, and swings it on the out-side of his Thum, without the help of his Fingers. . . . With a curious Magick Lanthorn, which presents several images near 6 Feet high, &c. &c. with five Images dancing to a Piece of Musick in the Form of Clock-work.[85]

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[82] Stafford and Terpek, <u>Devices of Wonder</u>, p. 301.
[83] Constance E. King, <u>Antique Toys and Dolls</u> (London, 1979), p. 93.
[84] <u>New-York Evening Post</u>, Sept. 8, 1746.
[85] <u>New-York Mercury</u>, April 13, 1767.

The lasting success of the magic lantern show influenced the development of other public exhibitions. One of the most popular was the panorama, patented by Robert Barker in 1787.[86] It consisted of a series of continuous large-scale painted perspective views that were displayed inside a semicircular or round building. The construction of a panorama was a major production that required the work of a variety of specialists, including painters of landscapes, figural studies, and architecture.[87] The images were sketched onto canvas and then transferred to the interior walls of the rotunda through an elaborate grid system.[88] Most likely, the camera obscura was used in the initial phases of fabrication in order to provide the most realistic and three-dimensional view. It was believed that "Panoramas had to be so true to life that they could be confused with reality."[89]

In 1794, Barker built the first circular environment in which he exhibited a 1,479-square-foot canvas of the city of London.[90] To witness the show at Leicester Square, observers entered the arena and ascended a flight of stairs to a viewing platform. A writer for the German magazine *Journal London und Paris* described the setting of a similar panorama featuring Brighton in 1798:

> After climbing various sets of stairs you suddenly emerge in the center of Brighton, on the stretch of green lawn called 'the Steyne.' It is midday. To the south the great expanse of the English Channel stretches out before you. I was so captivated by the sight that I held my breath, the better to take in the wonder, the sublimity of it all. You can see at least sixteen miles out to sea. . . . It is beyond the power of words! You must *see* this sea.[91]

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[86] Kemp, Science of Art, p. 213.

[87] Stephan Oettermann, The Panorama: History of a Mass Medium, trans. Deborah Lucas Schneider (New York, 1997), p. 55.

[88] Ibid., pp. 54-55. Oettermann provides a good explanation of this process in his chapter, "Technical Features of the Panorama and its Offshoots."

[89] Bernard Comment, The Painted Panorama (New York, 1999), p. 7.

[90] Hirsh, Seizing the Light, p. 10.

[91] Oettermann, The Panorama, p. 106.

The panorama served a useful purpose in the nineteenth century. It became the catalyst for conveying visual representations of contemporary events and popular thought to large groups of people. It was an engaging form of education that taught viewers about people and places from around the world. Stafford notes, "The panorama created the illusion of simultaneity between the consciousness of the viewer and the events she contemplates."[92]

Following Barker's showings, panoramic viewings became fashionable. Rotunda theaters featuring special exhibitions that changed every few months to offer a new subject were constructed in many European cities. The success of the demonstration promoted both the publication of souvenir booklets and the creation of smaller, more portable versions to be used in the observer's home. These miniature showings were available in sets comprised of individual sheets or in a single leaf that featured a continuous view when unscrolled from a small cylinder.

The diorama was a large-scale environment built for viewing transparent paintings. In 1815, Louis-Jacques-Mandé Daguerre, best known for his photographic invention, the daguerreotype, designed a 360° circular chamber with seats. It, too, featured scenes in the round, but Daguerre's diorama consisted of individual prints and paintings on large pieces of thin, translucent linen. Light was a crucial part of a diorama because it enabled spectators to see different scenes throughout the day, taking "the audience from dawn to dusk twice in about thirty minutes."[93]

Although its construction was based on two-dimensional designs, subjects in a diorama appeared three dimensional because of the way in which the painted surface was

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[92] Stafford and Terpek, Devices of Wonder, p. 96.
[93] Ibid., p. 325.

lighted. Hirsch explains, "Each picture was seen through a 2,800-square-foot calico window that was painted half opaque. The opaque portion was frontally lit and the translucent part was illuminated from behind, producing an illusion that the picture emitted a radiant light and was not on a flat surface."[94] The light was controlled through pulleys, cords, shutters, and screens that were manipulated by the operator.

Transmission of color depended not only on the pigments used in the painting but also the position of light. Daguerre wrote: "Lay two extremely bright colours, one red, the other green, of approximately the same strength on a canvas. Shine a light through so that they are illuminated through a red medium, as through coloured glass; the red pigment will reflect its own rays, and the green will remain black." He continued, "By replacing the red medium with a green one, the opposite will happen: the red will remain black, whereas the green will reflect the green pigment."[95]

The diorama featured only a few pictures at a time. Instead of switching images, the platform with the seated observers actually moved to the next scene. Hirsch comments, "The moving diorama is a harbinger of how mechanical devices can control human behavior. In it viewers gave up their autonomy and became part of a machine that determined how much time they would spend looking at a scene."[96] Stafford adds,

> Up to a point, this romantic black chamber resembled the baroque optical box equipped with an engraving at the focal point opposite the aperture. Where it differed was in the obliteration of any references to an outside world through the concealed manufacture of an immersive environment that mobilized puppetlike viewers.[97]

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[94] Hirsch, Seizing the Light, p. 10.
[95] Comment, Painted Panorama, p. 58.
[96] Hirsch, Seizing the Light, p. 10.
[97] Stafford and Terpek, Devices of Wonder, p. 100.

Through light, movement, and other special effects such as stage props and sound, "the Diorama . . . so convincingly simulated nature that it was -- at least visually -- a surrogate for the original."[98]

Nineteenth-century observers also enjoyed a miniature version of the special-effects theater. Called "the Portable Diorama," this show box with transparent images was used primarily as a tool for teaching painting techniques. An 1826 advertisement in the *London Times* heralded the instrument as "An elegant present for the Families of Nobility and Gentry."[99] Consequent acceptance of this model led to hand-held versions of the same.

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[98] Ibid., p. 326.
[99] Ibid., p. 327.

CHAPTER III

OPTICAL DEVICES USED WITH PRINTS

In his *Treatise on Optics*, English instrument maker Benjamin Martin discussed the potential of using scientific machines such as the camera obscura with printed views. He wrote, "An optical instrument for measuring the Angle of Vision" could also be used "for viewing Perspective prints, Pictures, &c. . . . It gives to Pictures such a natural and surprizing *Relievo,* as Make the Life itself."[100]

It is logical that the camera obscura and similar devices would eventually be used with engravings and paintings in addition to natural scenery. Utilizing ready-made prints enabled the observer to view subjects without having to travel outdoors. It broadened his horizons by including images of landmarks, buildings, and seascapes, places that might be too far or too difficult to visit.

By the mid-eighteenth century, trade cards for instrument makers and advertisements for sales of camera obscuras included references for use with prints. Henry Pyefinch's trade card included a price list for the instruments in his inventory: "camera obscura, in form of a book, the best @ £4, 4s," " The same adapted to view prints @ £5, 5s."[101] Self-proclaimed "optical, philosophical, mathematical and instrument-maker" Samuel Whitford of London publicized "Camera Obscuras, to

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[100] Benjamin Martin, A New and Compendius System of Optics (London, 1740), pp. 288, 290.

[101] H. R. Calvert, Scientific Trade Cards in the Science Museum Collection (London, 1971), entry 38. Stafford and Terpek cite a date between 1768 and 1782 for the trade cards. Stafford and Terpek, Devices of Wonder, p. 308.

delineate Landscapes and Prospects (and which serve to view Perspective Prints) made truly parallel."[102]

Newspapers in colonial America also advertised the camera obscura with printed views. In 1750, the *Boston News-Letter* included: "To be sold . . . a Set of Prints completely coloured, proper for viewing in Camerae Obscura."[103] Advertisements also indicated that specific views were being made for use in the machine. The *New-York Gazette, or, the Weekly Post-Boy*, 1753, stated, "Perspective views neatly colour'd for the Camera Obscura."[104]

That prints were coupled with written references to the camera obscura is important in determining how widespread the practice of using images and instruments together had become. This letter from Hart & Marshall to merchants, John Norton & Sons, was written in 1771: "Our Robert Hart having just taken unto himself a Wife and being in want of a good many Articles towards Housekeeping . . . 3 Looking glasses in plain Mahogany Frames, . . . 3 or 4 doz. of the most fashionable pictures for Room, . . . A sett of the best Geographical maps . . . A Small Camera Obscura with 3 or 4 doz. of Perspective Prints without frames mostly coloured and different views from the above glazed ones."[105]

Documentary evidence also provides insight into how the instrument was used. In 1794, the New-Museum "in the Front Rooms opposite the entrance of the Museum & Wax-Work" was built in New York. The collection contained a variety of amusements

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[102] Calvert, Scientific Trade Cards, plate 58.
[103] Boston News-Letter, May 24, 1750.
[104] New-York Gazette, or, the Weekly Post-Boy, July 9, 1753.
[105] Hart & Marshall to John Norton & Sons, March 7, 1771, John Norton & Sons Papers, John D. Rockefeller, Jr., Library, Colonial Williamsburg Foundation, Williamsburg, Va. Hart & Marshall were Scots factors in Virginia.

including a "musical concert eight day Clock," "a glass Republican Ship," "Fifty eight

cases with glass in front" containing birds, insects, and reptiles from the American,

European, Asian, and African continents, and "A very fine Camera, for viewing prints;

with fifty colored views of the most elegant buildings of ancient Rome, with some of its

antiquities. Six very handsome paintings of the first kind, being views in France."[106]

The camera obscura could be used with pictures only by purchasing a component

containing a lens and plane mirror. It enabled the buyer to retrofit his device. The book

viewer was one of the most common models that utilized this mechanism. In his

encyclopedia of 1819, Abraham Rees explained, "The glasses of the camera obscura are

frequently fitted to a portable machine shutting up in the form of a chest or book, so as to

be portable, and easily transported from place to place, and carried about by the artist. . . .

This camera is converted into an instrument for magnifying perspective prints and

drawings, and forms the best possible apparatus for that purpose."[107]

An example of a book viewer is the gilt-decorated, leatherbound box in Colonial

Williamsburg's collection (fig. 9). When closed, it looked like a volume from a

gentleman's library; when opened, the instrument was clearly a camera obscura. An

attachment, now missing, for viewing prints was once available. On the spine of the

"book" is "*Optique Persp./ Chambre Noir/ Par Luciny*," which translates approximately

to "perspective view" and "dark chamber." When in use, it is thought that the instrument

resembles a pyramid. The two sloping sides of the form come together at the top, forming

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[106] Columbian Gazetteer (S.C.), Oct. 16, 1794, quoted in Rita Susswein Gottesman, The Arts and Crafts in New York, 1777-1799: Advertisements and News Items from New York City Newspapers (New York, 1954), p. 401.

[107] Abraham Rees, The Cyclopaedia; or Universal Dictionary of Arts, Sciences, and Literature 6 (1819), s.v. "Cameras." Under this entry, Rees included directions for adapting the viewer to use with prints.

a triangular shape. Perhaps period citations to "optical pyramid machines" suggest these particular forms. The Victoria and Albert Museum in London owns a similar version built about 1750 with the inscription, "Optiques et Chambre Opscure par Seanegattil," the last part of the description likely a reference to the maker. The lens in this extant example is missing, but more than thirty engravings originally viewed with the device survive.[108]

Not all book forms of the camera obscura were used with prints, however. Neither of the two versions in the Harvard University collection was intended for any other use. The first, attributed to London instrument maker Benjamin Martin, is inscribed "Camera Obscura" on its spine.[109] It has not been determined whether Martin made the second device, but he acquired it for the university in 1765 at a cost of £3.13.6.[110] Prices for these machines varied. Depending on the degree of ornamentation or elaboration of design, the cost could differ by several pounds. A 1797 price list from instrument sellers W. & S. Jones includes "Pocket instruments . . . 9s to £1 16s 0d, and a large one which folded up to look like a book, . . . £8 18s 6d. A newly invented, 'very portable' camera obscura with sides of canvas which allowed it to be folded, . . . £2 2s 0d."[111]

Sir Joshua Reynolds owned another significant version of the book camera obscura, now in the collection of the Science Museum in South Kensington, London. Similar in shape to one of the Harvard forms, this version was presented to Lady Yates by the artist in the mid-1700s.[112] In his book *Art and Photography*, Aaron Scharf discusses the fact that Reynolds owned and probably experimented with the camera

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[108] Hammond, Camera Obscura, p. 97.
[109] David P. Wheatland, with assistance by Barbara Carson, The Apparatus of Science at Harvard: 1765-1800 (Cambridge, Mass., 1968), p. 130.
[110] Ibid., p. 127.
[111] Hammond, Camera Obscura, p. 82.
[112] Wheatland, Apparatus of Science, p. 127; Stafford and Terpek, Devices of Wonder, p. 308.

obscura. He believes that Reynolds was "fearful that the rigid optical accuracy fostered

by that instrument would tend to detract from the supremacy of the imagination" and

quotes the painter as saying:

> If we suppose a view of nature represented with all the truth of the camera
> obscura, and the same scene represented by a great Artist, how little and mean
> will the one appear in comparison of the other, where no superiority is supposed
> from the choice of the subject. The scene shall be the same, the difference only
> will be in the manner in which it is presented to the eye. With what additional
> superiority then will the same Artist appear when he has the power of selecting
> his materials, as well as elevating his style?[113]

In addition to professionally made models, homemade versions of the camera obscura

were also available. Joseph Harris outlined construction details in his *Treatise of

Optics*.[114] General knowledge of the instrument must have been widespread.

Increased use of the camera obscura with pictures led to the development of

various apparatuses specifically invented to view engravings. Based on the concepts of

the peep show and the camera obscura, these viewers were constructed for educational

and entertainment use in parlors of upper-middling-sort and gentry homes. Prices varied.

English instrument makers W. & S. Jones sold optical viewers for £1 and up, the

equivalent of two weeks' wages for a journeyman.[115]

References on scientific trade cards of the period indicate how prevalent these

devices were in England. Opticians James Ayscough, Thomas Barnett, Joseph Linnell,

Samuel Johnson, James Mann, and W. Dowling, to name a few, included variations of

the description "optical machines for viewing Perspective Prints [or Pictures]" in their

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[113] Aaron Scharf, <u>Art and Photography</u> (Middlesex, Eng., 1974), p. 21.

[114] Joseph Harris, <u>Treatise of Optics</u> (1775), quoted in Hammond, <u>Camera Obscura</u>, p. 89.

[115] J. A. Chaldecott, "The Zograscope or Optical Diagonal Machine," <u>Annals of Science</u> 9, no. 4 (Dec. 15, 1953), p. 317.

advertisements.[116] Citations in colonial American newspapers mark their widespread use

in the colonies. English advertisements offered optical machines during the 1740s and

'50s, while the devices were most popular in America from 1750 to 1780.[117]

References to the machines appeared in newspapers in major colonial cities such as

Philadelphia, Boston, and New York. In 1750, the *Pennsylvania Gazette* included the

following: "To be sold reasonable, . . . by Thomas Mathias, . . . a curious collection of

perspective views, done in the highest taste, and represented as large as nature, on the

principles of Sir Isaac Newton's Opticks." At the bottom of the ad, the printseller stated

that he "likewise sells perspective glasses, and teaches how they are fixt in boxes, the same

manner as the box he has for that purpose."[118] In this instance, it is possible that

"perspective glasses" refers not to the instrument with which to view the prints, but rather

to the optical aid or lens that was added to the machine.

In February 1750, Christopher Marshall of Philadelphia wrote, "To be sold . . .

Sundry curious perspective glasses, and a collection of neat perspective views."[119] In

June the same year, a similar ad read, "Just imported from England, and to be sold by

Joseph Beddome . . . magnifying mirrors for viewing perspective and coloured views."[120]

Further citations included "a curious mahogany mirror, with ninety two views of London,

France, Vienna, Venice, &c." and "magnifying mirrors for viewing perspective and

coloured views," both of which purportedly were "just imported from London."[121] These

examples, all of which appeared in the *Pennsylvania Gazette* in 1750, were advertised by

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[116] Calvert, Scientific Trade Cards, entries 7, 8, 132, 209, 251, 239.
[117] Stafford and Terpek, Devices of Wonder, p. 96.
[118] Pa. Gaz., Jan. 23, 1750, in Pa.Gaz., Folio I.
[119] Ibid., Feb. 6, 1750.
[120] Ibid., June 21, 1750.
[121] Ibid., Sept. 13, 27, 1750.

different merchants and sellers. References to these optical machines continued

throughout the century; in some instances advertisements in catalogs appeared as late as

1885.[122]

One of the more frustrating aspects of studying these instruments is that the names

of the devices differ. For instance, the title in Pike's catalog of optical instruments that

accompanies the diagram and description of one mechanism reads, "The Optical Diagonal

Machine, Print Glass, or Cosmoramma."[123] Terms that appeared more frequently in English

or American advertisements, catalogs, and inventories in the eighteenth century include

"optical diagonal machines," "optical pillar machines," "diagonal mirrours," "magnifying

mirrors," and "perspective glasses." The word "prospect" or "perspective" view, "print" or

"picture" was most common for the accompanying engraving. In Europe, the optical

machine was known as "optica," "optique," "Guckkasten," and "Camera Ottica" or

"Camere Ottiche." A wide range of similar terms such as "opticaprent," "vue d'optique,"

"Guckkastenbild," or "Guckkastenblatt," and "Realetti Prospettive" were applied to the

print.[124]

Of the many models, the most common was based on a version by English

instrument maker Edward Nairne, who developed a "New constructed Optical Instrument

for viewing Perspective Prints" prior to 1753 (fig. 10).[125] Nairne's model was popular

because of its adjustable height, which enabled viewers, regardless of stature, to gaze at

the image at eye level. The mirror, which hangs when not in use, could be propped at a

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[122] Allan Mills, "The Optical Diagonal Machine or Zograscope," Bulletin of the Scientific
Instrument Society, no. 28 (Mar. 1991), p. 18. Mills cites Negretti and Zambra's 1885 catalog which
includes a reference for "diagonal print machines, for viewing prints etc."

[123] Pike's Illustrated Catalogue of Scientific and Medical Instruments (1856; reprint, Dracut,
Mass., 1984), p. 185.

[124] C. J. Kaldenbach, "Perspective Views," Print Quarterly 2, no. 2 (July 1985), pp. 87, 91. Terms
are listed in order and reference the following countries: Holland, France, Germany, and Italy.

[125] Timothy Clayton, The English Print, 1688-1802 (New Haven, Conn., 1997), p. 140.

45-degree angle to reflect the print placed horizontally on the surface below. The illusion

of depth in a perspective print was heightened when it was used with an optical viewer

outfitted with a double convex lens and mirror; these additional parts helped to distort the

image further by enlarging and reflecting the printed subject. Stafford observes, "The

zograscope activates binocular vision such that the edges of the engraving curve, bowl-

like, towards the observer, lifting the figures and buildings from their two-dimensional

background. As in total wraparound architecture, flatness cues are suppressed in favor of

depth cues."[126]

These optical devices are referred to as "zograscopes" today, despite the fact that

the term did not gain acceptance until the twentieth century.[127] Chaldecott points out that

no reference to the term "zograscope" exists in the literature of the eighteenth and

nineteenth centuries. The sole exception occurred in the advertisements and catalogs of

London instrument maker George Adams (1704-1773). Adams consistently used the term

"zograscope" in connection with the optical device and perspective prints. According to

Chaldecott, records indicate that neither of Adams's sons nor the brothers W. and S.

Jones, who took over the family business after the death of George Adams, the younger,

referred to the instrument by this name.[128]

Other popular optical machines included this late eighteenth-century device (fig.

11). Possibly American, its most notable feature is the trestle-base stand. It was common

to see viewers made of mahogany or cherry and decorated with inlaid woods and

elaborate carving. The materials and finishes of parlor viewers often were of a high

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[126] Stafford and Terpek, Devices of Wonder, p. 96.
[127] Supplement to the Oxford English Dictionary, vol. 4, s.v. "zograscope."
[128] Chaldecott, "Zograscope," pp. 315-316.

quality that matched the furniture with which it was displayed and used. The front and sides of the device are grained to imitate mahogany.

The rarest example may be this labeled late eighteenth-century tambour desk by Edmund Johnston of Salem, Massachusetts, which doubles as a viewer (fig. 12).[129] In what would normally function as drawer space, the area behind the lower tambour doors features a darkened chamber for perspective prints. A hinged door on the reverse provides necessary light and access, and, when opened, the middle drawer allows a reflection of the engraved view to be seen through the double convex lens and mirror above.

Smaller models like William Hooper's boundless gallery, a rectangular box with a peephole at one end and sometimes outfitted with a lens, contain a progression of well-spaced miniature prints inside. The origin of this design most likely came from the perspective theater. In the eighteenth century, printseller and publisher Martin Englebrecht of Augsburg, Germany, was responsible for producing thousands of these horizontal and vertical devices. Illuminated and cut out, the prints were placed in successive order with spaces between. Slots inside the wooden or paperboard show boxes acted as viewing stands. Viewing the entire set at once created a heightened sense of spatial illusion. Upright devices included a mirror at a 45-degree angle to enhance the three-dimensionality of the view.

Printed subjects varied, yet usually centered on important historical or biblical themes or dramatic scenes. Later nineteenth-century models omitted the viewing box entirely and simply consisted of hand-colored engravings. These examples, called

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[129] Only two examples of this type of viewer are known. One is in the collection of Henry Francis Du Pont Winterthur Museum. Its attribution to Johnston is based on this model in the Peabody Essex Museum.

panoramas, were produced with paper hinges that connected the printed scenes along the edges. Holes in the front cover allowed a person to pull the prints apart like an accordion and to see the image with the illusion of depth and dimension. After use, the observer could easily store the object by refolding the device to its original configuration and either securing it within the attached cardboard cover or placing it into a separate marbled case. These later versions depicted contemporary events. All varieties seem to have been enjoyed by well-to-do Europeans "as fanciful, amusing, or instructive decorations for the home."[130]

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[130] Stafford and Terpek, Devices of Wonder, p. 336.

CHAPTER IV

PERSPECTIVE PRINTS

Travel abroad was an essential part of an upper-gentry youth's education in the eighteenth century. It was believed to broaden the mind of a young adult and provide him with useful knowledge and the necessary attainments for future civic and governmental leadership. The Grand Tour was a combination of education and amusement that exposed the traveler to foreign languages, literature, fine arts, architecture, history, social graces, manners, and customs.

During travel, Francis Haskell notes, "The acquisition of major antiquities was, indeed, the most obsessive ambition of all visitors."[131] Among the mementos collected were pictures of places visited, including paintings of romantic landscapes by Nicolas Poussin, scenes of Italian cities by Canaletto, and engravings of topographical and imaginary views by Giovanni Battista Piranesi.

By the mid-eighteenth century, travel was available to people not in the upper class. McKendrick writes, "Middle-class families were on the move, visiting country houses and ancient ruins, viewing the industrial wonders of Boulton and Watt, Wedgwood, Arkwright, and braving the dangers and dirt of coal-mines, sailing in splendid barges along the new canals, going off to sea -- to take the water externally and

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[131] Andrew Wilton and Ilaria Bignamini, Grand Tour: The Lure of Italy in the Eighteenth Century (London, 1996), p. 11.

internally."[132] Books illustrated with pictures of cheerful families journeying throughout

the countryside to cultural destinations around the world were published in large numbers

and marketed to the mainstream public. The result was an increase in people participating

in outdoor leisure pursuits.

For those who could not travel, there were other ways to view the wonders of the

world. An eighteenth-century collector's guide explains,

> [By means of] Engraving . . . all the celebrated Performances and Inventions of
> the most eminent Masters, are exceedingly well imitated, and reduced to so small
> a Size, as to be communicable to the whole World. 'Tis by the Assistance of this
> Art, those who have never crossed the Seas, are acquainted with the magnificent
> Structures, beautiful Statues, inimitable Paintings, &c. with which . . . other
> Countries . . . are adorned.[133]

Engravings informed people about current events and historical subjects. The

Reverend Prince, a clergyman from Salem, Massachusetts, shared his knowledge of

science and the arts through his print collection. Prince's biographer writes:

> In architecture, painting, and the fine arts generally, his taste was highly
> cultivated. His collection of engravings and specimens was very extensive and
> curious. By means of optical instruments he was enabled to make a most
> satisfactory display of all these treasures of knowledge. In the course of a winter's
> evening, his delighted visitor, sitting all the while quietly in his chair, was enabled
> to inspect the temples and the structures of ancient and modern Rome, to explore
> the ruins of the old world, to traverse the streets of London, Paris, St. Petersburg,
> to visit the villas of Italy and noblemen's seats in England, to watch the
> successive aspects of an eruption of Aetna or Vesuvius, and literally to survey the
> whole earth and the glories thereof.[134]

The types of engravings most often used with viewing devices were referred to as

"perspective prints" (fig. 13). These landscape views were created with a technique called

linear perspective (fig. 14), a longstanding artistic convention that used imaginary

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[132] McKendrick, Brewer, and Plumb, Birth of a Consumer Society, p. 308.
[133] Marjorie B. Cohn, Francis Calley Gray and Art Collecting for America (Cambridge, Mass., 1986), p. 184.
[134] Ibid., p. 183.

converging lines and vanishing points to create the illusion of receding space. Linear perspective provided the appearance of three-dimensionality to a two-dimensional surface and was further enhanced when people looked at the printed image through an optical machine outfitted with a lens and mirror.

The first mention of perspective view used with an optical viewer occurred in England. In 1746, printsellers Thomas and John Bowles publicized in the *General . Advertiser* printed views of London and Venice "proper to be view'd in concave Glasses."[135] The market for perspective prints soon expanded dramatically. At first, the devices utilized pre-existing topographical and landscape views. "The new invention did not need prints engraved specially for it, it merely exaggerated correct linear perspective."[136] Further, engravings were abundant. By this time, "Prints of old masters and modern artists were a commonplace of provincial as well as London life."[137]

Printsellers quickly recognized the potential for new opportunities and began to issue images specifically for use with optical devices. Robert Sayer's newly published catalog advertised the availability of "Two Hundred & Six Perspective Views Adapted to the Diagonal Mirror, or Optical Pillar Machine" in 1753.[138] Twenty-two years later, Sayer and Bennett's print catalog devoted eight of one hundred and fifty pages to perspective views, stating they were "admirably adapted for the Diagonal Mirror or Optical Pillar Machine."[139]

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[135] Clayton, The English Print, 1688-1802 (New Haven, Conn., 1997), p. 140.
[136] Ibid., p. 140.
[137] McKendrick, Brewer, and Plumb, Birth of a Consumer Society, p. 308.
[138] Clayton, English Print, p. 140.
[139] Sayer & Bennett's Enlarged Catalogue of New and Valuable Prints, in Sets, or Single; Also Useful and Correct Maps and Charts; Likewise Books of Architecture, Views of Antiquity, Drawing and Copy Books, &c. &c. (1775, reprint, London, 1970), p. 58.

Colonial engravers also took full advantage of the craze and printed views for

optical machines. A 1779 advertisement in the *South Carolina and American General*

Gazette stated,

> Thomas Coram having been frequently solicited to engrave a large view of the
> memorable engagement at Sullivan's Island, June 28, 1776, has at length
> completed it on a copper plate 10 ½ x 15 inches; impressions of which he will
> sell, either plain or coloured, at as low a price as the times will admit. He has
> printed and coloured a few counterproofs of the same plate, for the curiosity of
> those who buy them for perspective glasses.[140]

Subjects for perspective views included topographical, religious, and historical

themes. English printsellers Sayer and Bennett described their selection of holdings:

"Perspective Views, of the Most eminent Buildings, Streets, Squares, &c. in the City of

London and *Westminster,* the Royal Palaces, Hospitals, Villages, Noblemen and

Gentlemen's Seats and Gardens on the Borders of the River *Thames,* with other Castles and

Romantic Views, &c. in *England, Scotland,* and *Ireland.*"[141] In the colonies, the *Maryland*

Gazette advertised the sale of "A considerable collection of Perspective Views of the most

magnificent public and private Edifices, Bridges, Monuments and Ruins, in *Rome, Venice,*

France, England, and *China;* with a curious magnifying perspective Mirour."[142]

Perspective prints also featured scenes from Italy, Portugal, Moscow, Brazil, and Quebec.

Some engravers sketched their subjects from life, probably with the aid of a

camera obscura, while others copied them from existing prints. German artists from the

printmaking center of Augsburg were known to have based their work on English

prototypes.[143] Due to copying and the exaggerated three-dimensional effect, sources for

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[140] South-Carolina and American General Gazette, July 20, 1779.
[141] Sayer & Bennet's Enlarged Catalogue, p. 58.
[142] Maryland Gazette, April 1, 1762.
[143] Clayton suggests that the German practice of copying English prints really took hold with
perspective views in the 1750s. English Print, p. 274.

engravings are difficult to determine. Modern-day scholars have gone so far as to

characterize such views as "fictitious."[144] Others, including Donald Cresswell, are careful

to weigh all considerations when analyzing period engravings: "Too often in our search

for truth we hear the word 'fraud' connected to such prints, but we need to exercise

caution in judging the picture makers of the late eighteenth century."[145]

The production of perspective prints was an international business. Because great

quantities were exported to foreign markets, many engravings had bilingual titles and

descriptive captions of their scenes on the top and bottom margins. A reversed title, a

distinguishable feature of the perspective print, engraved at the top of the image enabled

viewers to identify the reflected image while looking through the optical machine.

Of the many surviving perspective prints, those produced in London are the most

celebrated for their high degree of accuracy and quality. English views are characterized

by a graduating blue sky that softly changes from dark blue at the top to a lighter blue or

white color at the horizon.[146] Those executed after the enactment of the 1734 copyright

law include detailed publication information such as publisher, location, and date.[147]

French perspective prints differ from those of other countries. Names of

publishers and cities appear on the print, but engraver and designer names generally do

not. In some cases, the publisher and artist were one and the same artisan, rather than a

well-trained and established printmaker.[148] Most Parisian engravers had their shops on

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[144] Martin P. Snyder, City of Independence: Views of Philadelphia Before 1800 (New York, 1975), p. 254.

[145] Donald H. Cresswell, "Late Eighteenth-Century American Harbor Views Derived from Joseph Vernet and Richard Paton," in American Maritime Prints, ed. Elton W. Hall (New Bedford, Mass., 1985), p. 60.

[146] Kaldenbach, "Perspective Views," p. 95.

[147] Ibid. Kaldenbach's article is a useful source for determining the national characteristics of perspective prints.

[148] Ibid., p. 100.

the Rue Saint Jacques. Jacques Chéreau was the most prolific, executing more than 174 views of international scenes, monuments, and cityscapes.[149]

French views are characterized by a limited palette and quick application of color. Broad strokes of paint overlap one another and extend beyond the perimeters of the engraved or etched line. In contrast to the highly detailed workmanship of other foreign-made views, this seemingly haphazard method of painting brings to question the extent to which prints needed to accurately portray their subject. Gombrich argues, "The possibility that all recognition of images is connected with projections and visual anticipations is strengthened by the results of recent experiments. . . . This is the reason why the impression of movement, and thereby of life, is so much more easily obtained with a few energetic strokes than through elaboration of detail."[150] In the case of perspective prints and optical machines, it seems as if symbolic references were successful in projecting the intended subject matter and view. Perhaps the speed of execution was purposeful and can thus account for the extensive body of extant French examples.

Publishers from Augsburg, Germany, enjoyed success with perspective prints from 1770 to 1790. Due to the high demand for optical prints in foreign markets, German engravers often copied their images from existing prints, basing their work entirely on examples sold by competitors. Consequently, scenes were sometimes mislabeled.[151] It is also common to find grammatical errors in the foreign titles and the descriptions of views. The broad bands of pinks and blues that decorate the skies and the bold yellow, red, blue, and green highlights that color buildings and scenery are more positive

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[149] Ibid.

[150] Gombrich, Art and Illusion, p. 228.

[151] Kaldenbach, "Perspective Views," p. 102.

characteristics of German views. This can best be seen in the work of Josef Carmine, who

produced about one hundred and fifty perspective prints.[152]

Numerous advertisements attest to the popularity of perspective prints both in

England and America. As early as the 1750s, Thomas Jeffreys, mapmaker and

geographer to King George III, marketed his print stock as "The greatest variety of the

best English Prints." He advertised the availability of "a great number of Views of the

most remarkable Places, Cities, Palaces, &c. either plain or colour'd for the Diagonal or

Concave Glass."[153] Colonial American merchants also publicized the latest optical

devices and prints. Listings included "Perspective views of palaces, and other famous

buildings in England and Italy," "Optical pillar machines for magnifying prints, a

quantity of coloured prints on pasteboard, &c &c.," "A perspective glass (through a

handsome frame) with 30 grand views," and "the greatest variety of perspective views for

diagonal mirrors."[154]

In terms of ownership, of particular interest is Williamsburg resident and

Presbyterian minister, William Holt's holdings of "Sayer Prints for 144 Views & 2

optical Glasses."[155] While middling-sort patrons could afford the perspective print, the

device that accompanied the view was expensive with the average price ranging from

roughly 18s to £2 12s. 6d.[156] Depending on the individual's income, the cost of such an

amusement could be prohibitive. In Europe, and most likely in the colonies as well, a

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[152] Ibid., p. 102.

[153] Clayton, English Print, p. 114.

[154] Pa. Gaz., May 21, 1747, in Pa. Gaz., Folio I; Pa. Gaz. Jan. 8, 1767, in ibid., Folio III (1766-1783); Dunlap's Maryland Gazette, Apr. 28, 1778; Pennsylvania Chronicle, Dec. 12, 1768.

[155] William Holt, 1764, Virginia Gazette Daybook, 1764-1766, Alderman Library, University of Virginia, Charlottesville, Va. (photocopy, John D. Rockefeller, Jr. Library, Colonial Williamsburg Foundation, Williamsburg, Va.).

[156] Clayton, English Print, p. 141.

laborer "on an average wage of no more than one to two shillings a day, . . . would have hardly been likely to afford such luxuries."[157]

Conversely, perspective prints occupied "the middle ground of the print market" costing about one shilling for an uncolored engraving and two shillings for a colored one. Because of these prices, print scholar Sheila O'Connell believes that the views were "too expensive to be properly classed as popular." However, "they were clearly bought for entertainment rather than as works of art for connoisseurs."[158] Eighteenth-century printsellers Sayer and Bennett play to the notion of selling prints to a broad market and suggested that in addition to being used with optical devices, perspective views made "genteel Furniture when Framed and Glazed."[159] Framing the print with glass and hanging it on the wall certainly provided an acceptable option for those less fortunate.

While the gentry used optical machines and prints for formal entertaining, perspective prints were also utilized in more intimate settings.[160] Period books attest to this function. Johann Bischoff's 1764 treatise publicized the application of the instrument and view for educational purposes.[161] Francois Cazenave's aquatint engraving, L'Optique, about 1800, illustrates this point (fig. 15). Stafford and Terpek conclude that "It may be that the optical box with its architectural and urban vues d'optique functioned as a visual aid for teaching architectural styles, in the same way that photographs, slides, and videotapes are employed today in art history courses."[162]

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[157] Kaldenbach, "Perspective Views," p. 95.
[158] Sheila O'Connell, The Popular Print in England (London, 1999), p. 40.
[159] Sayer & Bennett's Enlarged Catalog, p. 58.
[160] Adventures in CyberSound, p. 3, available at www.acmi.met.au/AIC/VUE_D_OPTIQUE.html.
[161] Hecht, Pre-Cinema History, entry 76B.
[162] Stafford and Terpek, Devices of Wonder, p. 349.

In addition to public use of optical devices and perspective prints in traveling

entertainments, an advertisement in the *Pennsylvania Gazette* recorded their utility in the

tavern. Robert Mullan stated that he

> . . . continues the business of Tavern Keeper, at that beautiful situated house lately
> occupied by his father Thomas Mullan . . . [and] has a very fine perspective glass,
> with a great number of very elegant views, consisting of the grandest palaces,
> gardens, cities, public and private buildings in Europe, &c. Which Ladies and
> Gentlemen may agreeably amuse themselves."[163]

Because of their varied use, perspective prints were often adapted. In some

instances, they were mounted onto a stiff card for support and protection. This technique

was especially common with prints placed vertically in optical viewing machines. In

1750, printseller Peter Brookes advertised prints "colour'd and pasted on Pastboard;

proper for the Concave Glasses or Diagonal Mirrors."[164] These mounted views were

often trimmed to the plate mark, and sometimes the title and description were removed

and pasted onto the reverse.

Other techniques were employed to enhance the three-dimensionality of prints.

One method was to trim and mount the view onto cardboard and then paint the edges

black. Darkening the margins or sides of a print emphasized the engraved image in the

shadowy interior of a machine that required the viewer to peer inside. Johan Bischoff

wrote in 1764: "One should cover the flat mirror so much until one sees through the lens

neither the edge of the painting [print] nor anything outside the edge, but only the

painting almost entirely . . . In *opticas* [optical viewers] in which one cannot cover the

mirror one can help by blackening the edges of the image.[165]

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[163] Pa. Gaz. Apr. 26, 1775, in Pa. Gaz., Folio III.
[164] Clayton, English Print, p. 140.
[165] Kaldenbach, "Perspective Views," p. 90.

The most visually stunning perspective views are those mounted on stiff cards

that include holes and perforations cut and punched in areas to indicate windows or other

sources of light. The holes on the reverse of the print are covered with paper, tissue, mica

flakes, colored varnishes, and paint (fig. 16). When lit from behind, the print is

transformed to a darkened, perhaps nighttime, scene illuminated with light and color (fig.

17). Terpek believes these engravings "had an impact in the mid-eighteenth century

similar to that of television and its early elite audience in the mid-twentieth century."[166]

Backlit perspective prints were sometimes viewed with a special kind of optical

device called an illuminating optical machine.[167] Unlike other models, this horizontal

apparatus did not include a mirror. Instead, it was similar to a box viewer; it was enclosed

and had a lens at one end and candles and a vertically placed print at the other.

While the most common way to acquire these prints was through a print

publisher, contemporary accounts reveal they could also be made at home. William

Hooper explained in *Rational Recreations* (1783) how to make "transparent

illuminations":

> With a small circular tool you are to cut out all the places where the light is
> intended to appear, or where it is expressed, if the print represent an illumination.
> . . . These prints must by no means be transparent, . . . on the contrary, they should
> be printed on a thick paper, or rather it should be doubled, that very little of the
> engraving may appear. Behind the print must be placed a very fine transparent
> paper, varnished, fixed on a frame, and lightly painted with a deep yellow, or
> saffron colour, which must be laid on thickest at those places that are opposite the
> parts of the print that are to appear at the greatest distance.[168]

Whether homemade or purchased, perspective prints were available through a myriad of

avenues to anyone who desired them.

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[166] Stafford and Terpek, <u>Devices of Wonder</u>, p. 193.

[167] Kaldenbach, "Perspective Views," p. 91.

[168] Hooper, <u>Rational Recreations</u>, p. 191.

CONCLUSION

Despite the allure of engraved views, innovations in photographic technology in the mid nineteenth century led to the demise of the perspective print. Stereographs, or photographs printed in duplicate and adhered to stiff board, quickly replaced artists' renderings. Because the card-mounted photographs were composed of two similar images, specialized instruments with binocular viewing, such as stereoscopes, assisted observers in combining the dual pictures into one (fig. 18).

Mechanical innovations and mass marketing resulted in a vast number of stereoscopic photographs being produced and sold. Like perspective prints, stereographs educated and delighted viewers with landscapes, monuments, cityscapes, and seascapes. Stereo views also depicted scenes that the public recognized and understood, such as images from everyday life, interiors, figural studies, and portraits. They remained in production until the mid-twentieth century, attesting to their enduring popularity.

While the stereoscope with its sliding wooden cardholder was the most recognizable form of the nineteenth-century stereoscopic viewer, the best-known instrument of the twentieth was the View-Master, the plastic toy that, with a pull of its lever, forwarded a round paper disk of photographic images. Much like earlier counterparts, this amusement brought realism by illustrating contemporary scenes and subjects in three dimensions. A 1947 brochure advertised that the "View-Master brings

you pictures that 'Come to Life.' "[169] Reels on geography, travel, natural science,

medicine, children's stories, and biblical tales were sold as educational tools to teachers

and parents. At midcentury, Sawyer's *Catalog of Stereoscopic Pictures* included over

two thousand views.[170]

Just as camera obscuras, show boxes, peep shows, and magic lanterns gave way to

View-Masters and other modern instruments, recent technological improvements have

made even View-Masters obsolete. Surround sound now enhances spectators' auditory

experiences in movie theaters or watching television at home. The Internet offers direct

access to museums, resorts, and sites all over the world through virtual tours. Computer

games enable players to become characters in a game, manipulating and challenging

themselves and opponents. The makers of NFL GameDay go so far as to promise that

their product can put "the power and athleticism of the NFL in the palm of your hand."[171]

Despite technological change, it is important to recognize the advanced degree to

which eighteenth-century optical instruments and perspective prints were developed and

utilized. Stafford reminds us that

> The panorama as well as the zograscope, the camera lucida, and the stereoscope
> all mobilized vision, capturing evanescence on the fly. They exploited the human
> eye's optical properties to feed demand, created by the expanding culture of
> travel, for volumizing instruments, for technologies able to bring the air of
> particular places and the density of things together on paper, canvas, or
> photograph, in a snap.[172]

Sophisticated for their time, instruments and engravings offered observers an

intellectual pursuit that combined the scientific spirit of technological innovation with the

popularity of a leisure activity. Amusing, but also educational, optical devices and

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[169] View-Master Reel List (Portland, Ore., 1947).
[170] A Catalog of Stereoscopic Pictures (Portland, Ore., 1947).
[171] See www.playstation.com for more information on this computer game.
[172] Stafford and Terpek, Devices of Wonder, p. 96.

perspective views enlightened viewers through picturesque scenes from near and far. Originating in the materials, form, and purpose of the camera obscura, the combination of instruments and prints gained the acceptance of the scientific and learned community and a variety of social classes and age groups. Although much has changed since then, the basic concept of eighteenth-century optical viewers and perspective prints as educational amusements lives on.
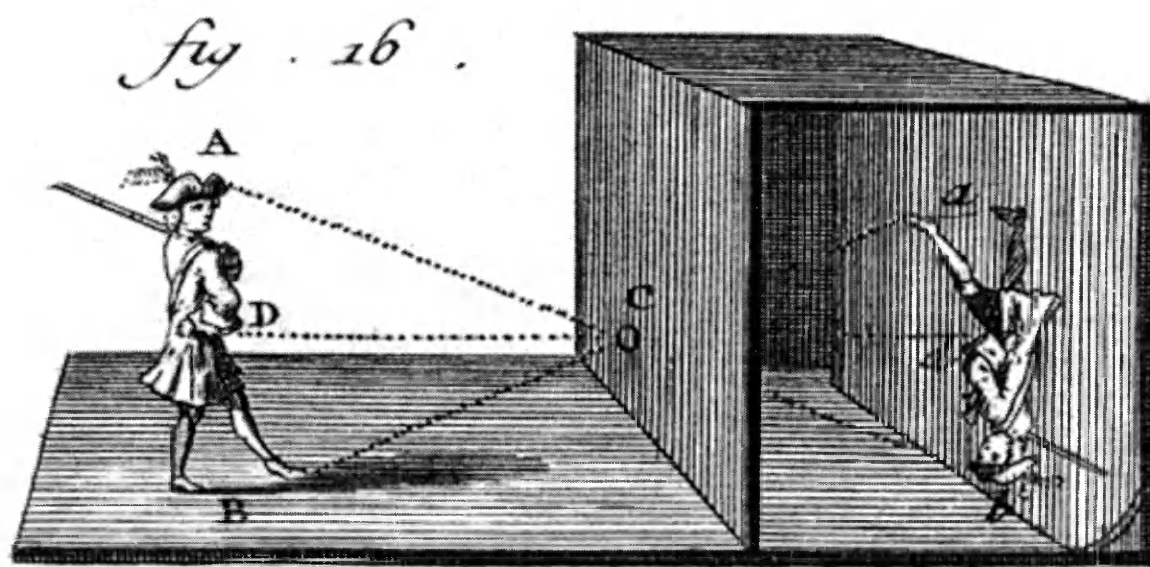
APPENDIX: ILLUSTRATIONS

FIGURE 1

LA RIVIERE D'AMSTEL A AMSTERDAM. Engraver unknown. Possibly Augsburg, Germany. Ca. 1760-1780. Hand-colored line engraving with etching. Courtesy, Colonial Williamsburg Foundation, G1971-2830.
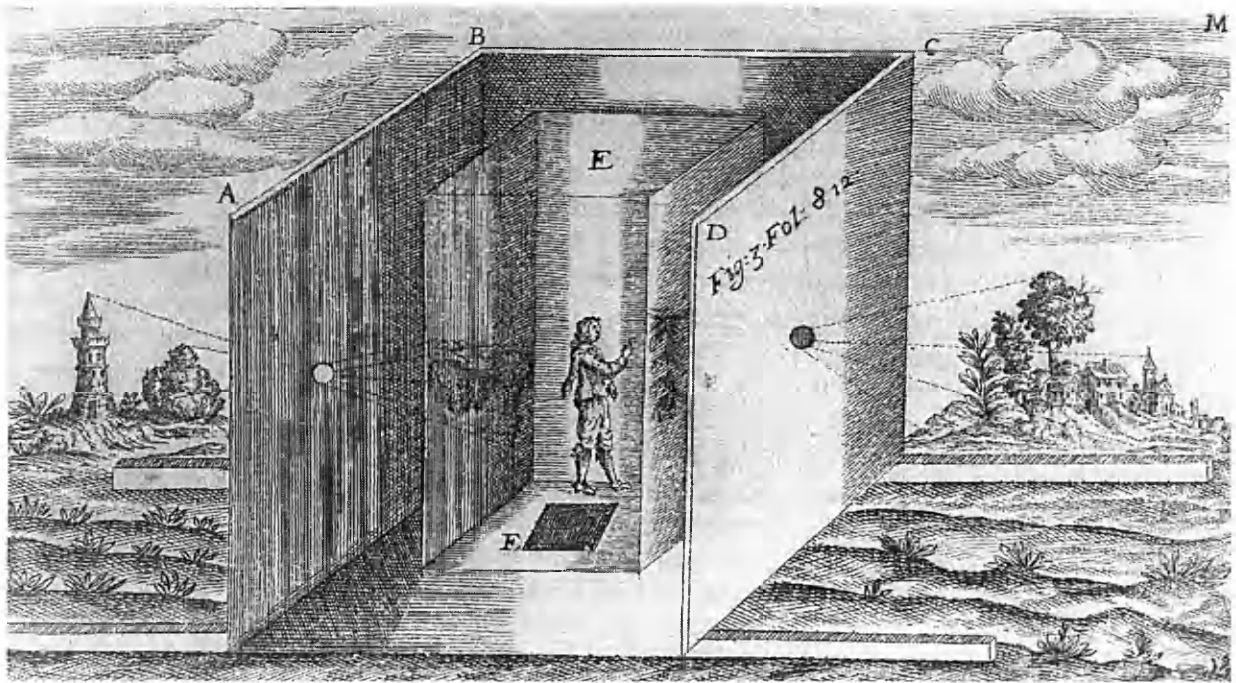
FIGURE 2

Detail of <u>Optique</u>. Plate 1 in Denis Diderot, <u>Recueil de Planches, sur Les Sciences, Les Ats Liberaux, et Les Arts Mechaniques</u>. Vol. V. Paris, France. 1767. Courtesy, CWF.

FIGURE 3

Portable Camera Obscura. In Athanasius Kircher's <u>Arts magna Lucis et umbrae, in decem libros digesta</u>. Rome, Italy. 1646. Courtesy, Gernsheim Collection, Harry Ransom Humanities Research Center, The University of Texas at Austin.

FIGURE 4

Southwark Fair. Engraved by William Hogarth. London, England. 1733. Black-and-white line engraving. Courtesy, CWF, 1967-571.
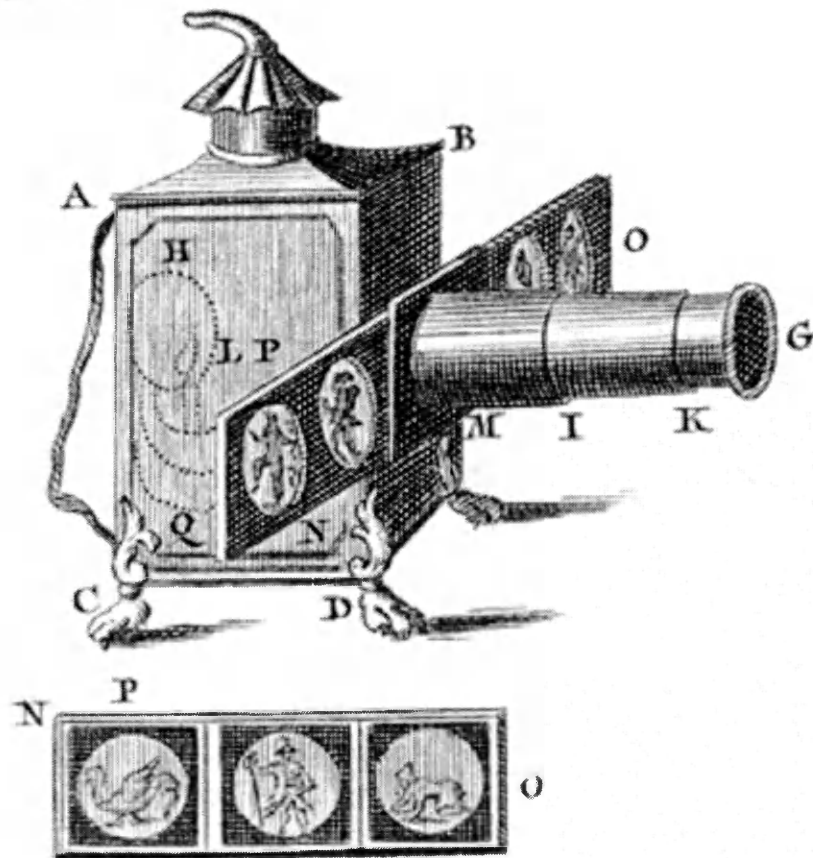
FIGURE 5

Detail of an Uncut Sheet of Playing Cards. Maker unknown. France. 1800-1825. Black-and-white line engraving with aquatint. Courtesy, CWF, 1962-207.
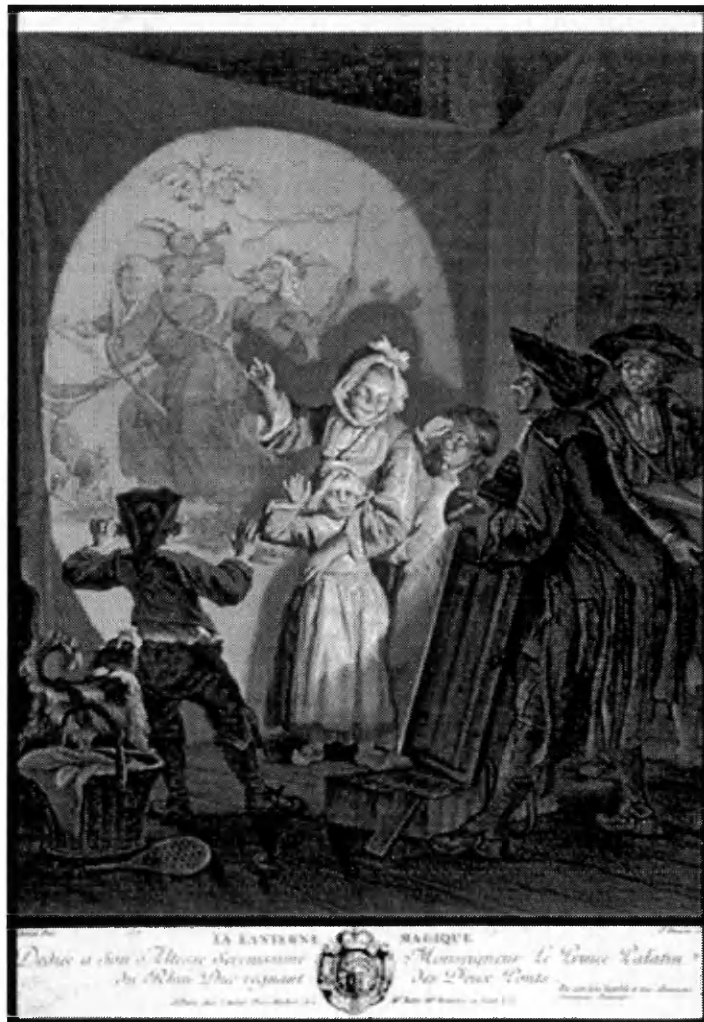
FIGURE 6

The POLITICAL RAREE-SHOW: or a Picture of PARTIES and POLITICS, during and at the close of the Last Session of Parliament. Engraver unknown. Published by Fielding and Walker in Westminster Magazine. London, England. July 1, 1779. Black-and-white line engraving. Courtesy, CWF, 1960-71.
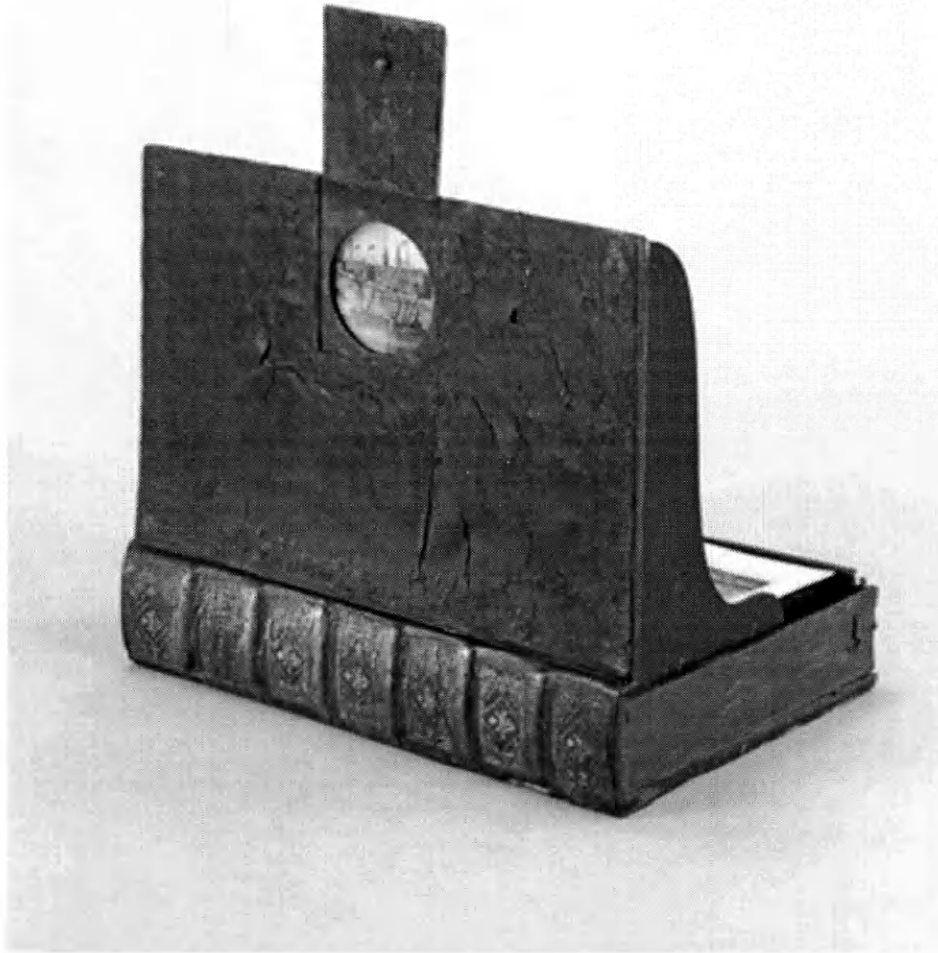
FIGURE 7

Detail of Optique. Plate 1, fig. 10 in Denis Diderot, <u>Recueil de Planches, sur Les Sciences, Les Ats Liberaux, et Les Arts Mechaniques</u>. Vol. V. Paris, France. 1767. Courtesy, CWF.

FIGURE 8

La Lanterne Magique. Engraved by Jean Ouvrier after a painting by Johann Eleazar Schenau. Paris, France. 1745-1754. Black-and-white line engraving. Courtesy, CWF, 1967-507.
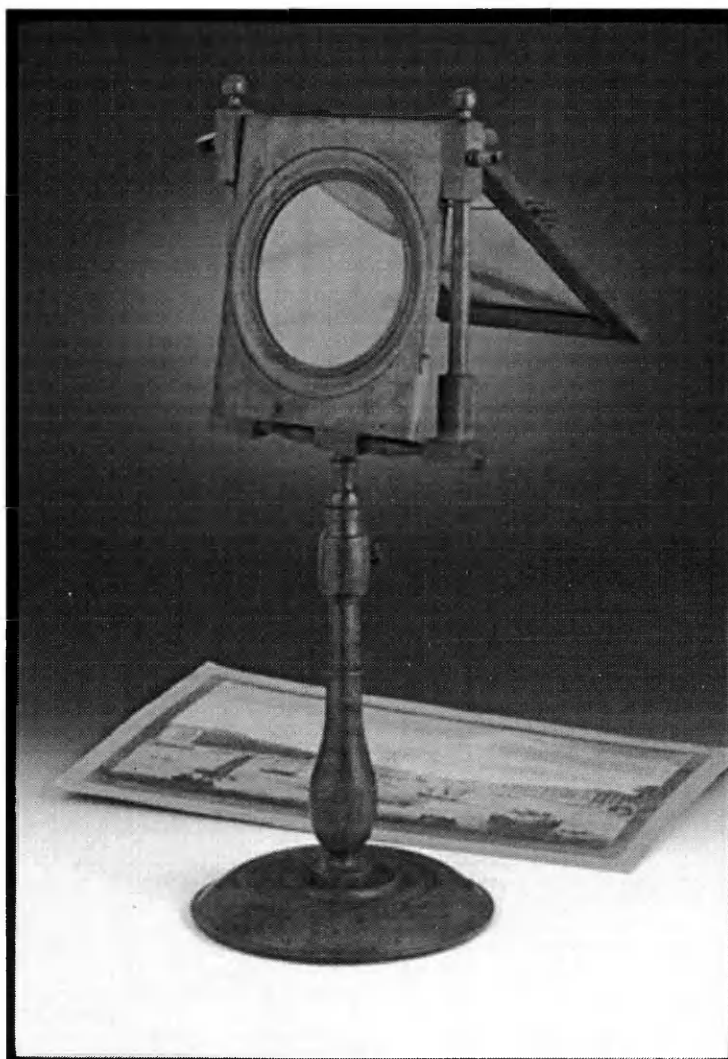
FIGURE 9

Optical Viewer in Form of a Book. Maker unknown. Inscribed: <u>Optique Persp</u>./ <u>Chambre Noir</u>/ <u>Par Luciny</u>. France. Ca. 1800. Leather and wood. Courtesy, CWF, G1971-1157.
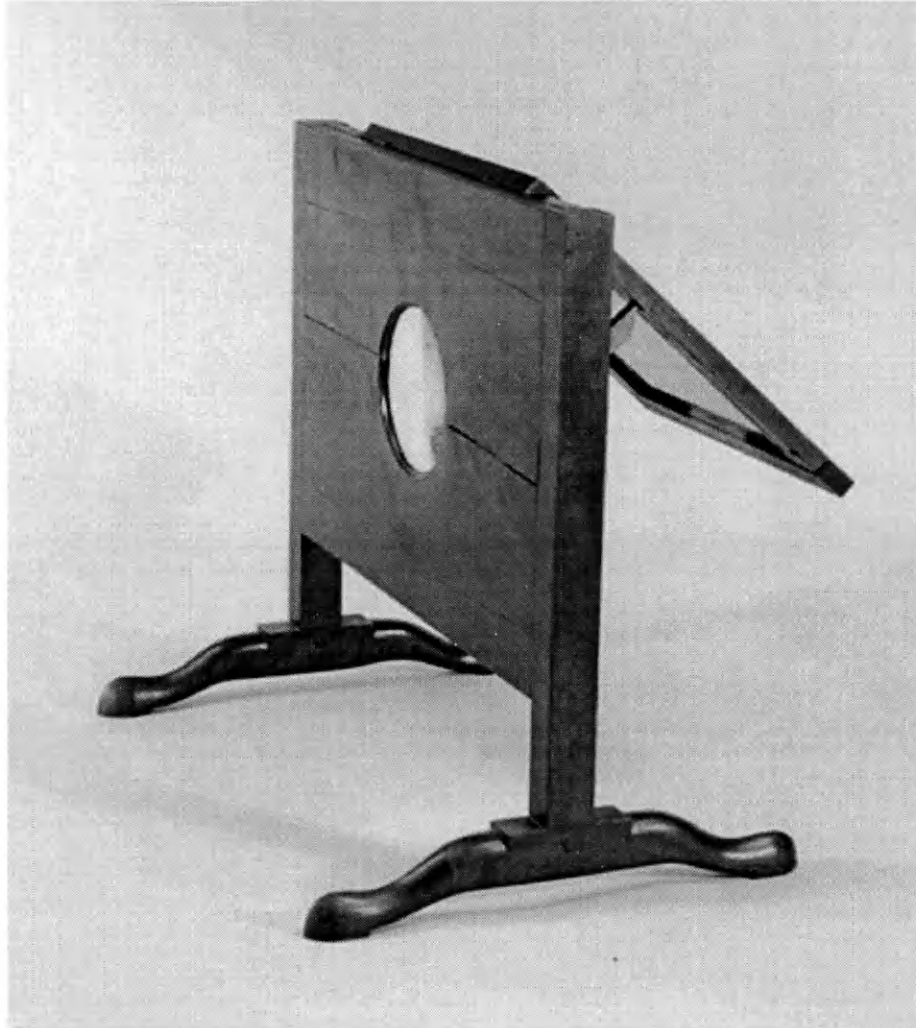
FIGURE 10

Optical Viewer. Marker unknown. Possibly English or American. Late eighteenth century. Fruitwood, double convex lens, and silvered glass. Courtesy, CWF, G1977-342.

FIGURE 11

Trestle-Based Optical Viewer. Maker unknown. Possibly American. Late eighteenth century. Cherry, oak, glass, silvered glass, and paint. Courtesy, CWF, 1952-250, A.
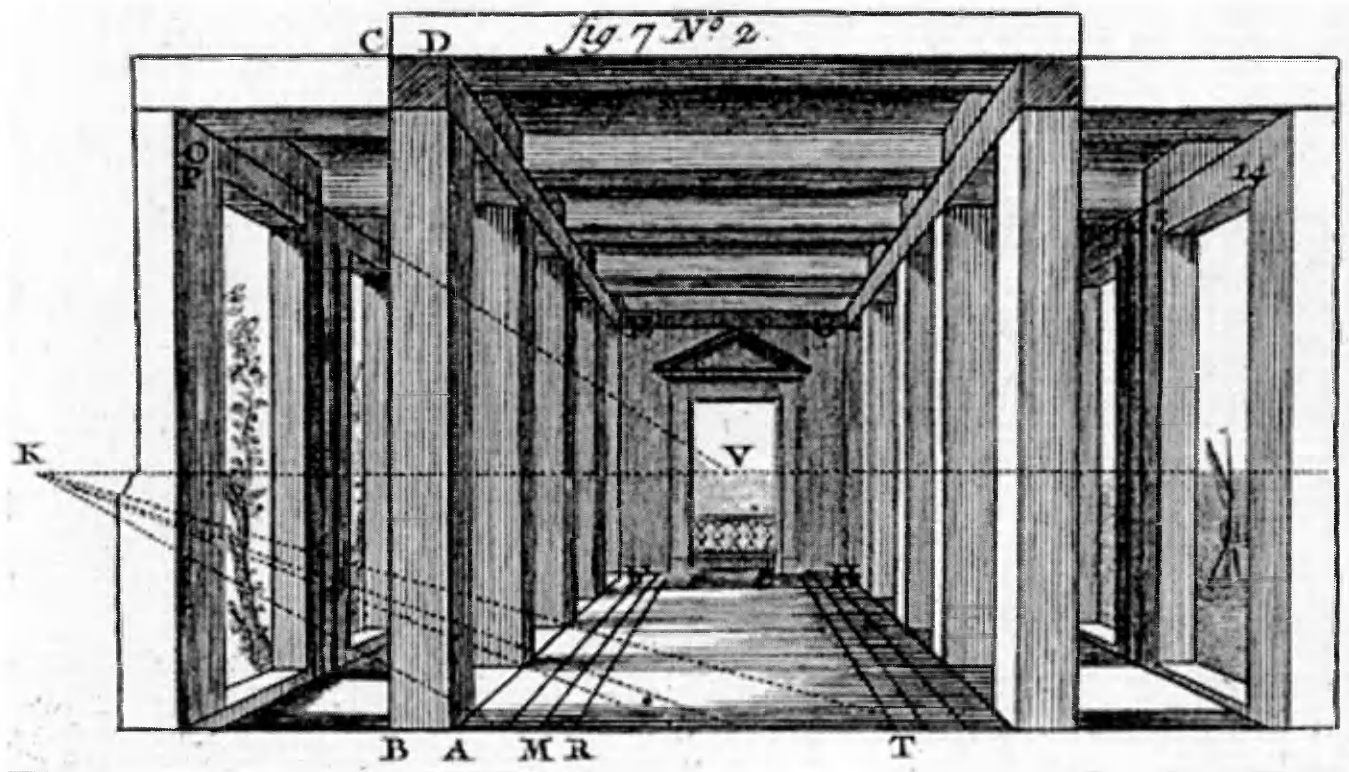
FIGURE 12

Tambour Desk with Optical Viewer. Edmund Johnson. Salem, Mass. 1796-1800.
Mahogany, mahogany veneers, white pine, yellow pine, glass, and silvered glass.
Courtesy, Peabody Essex Museum.

FIGURE 13

Vue de Hotel du Lord Maire, qui comprend la Façade, et le Coté Occidental de Londres. Engraved by Frederic Leizelt. Augsburg, Germany. Ca. 1750-1775. Hand-colored line engraving with etching. Courtesy, CWF, 1950-662.
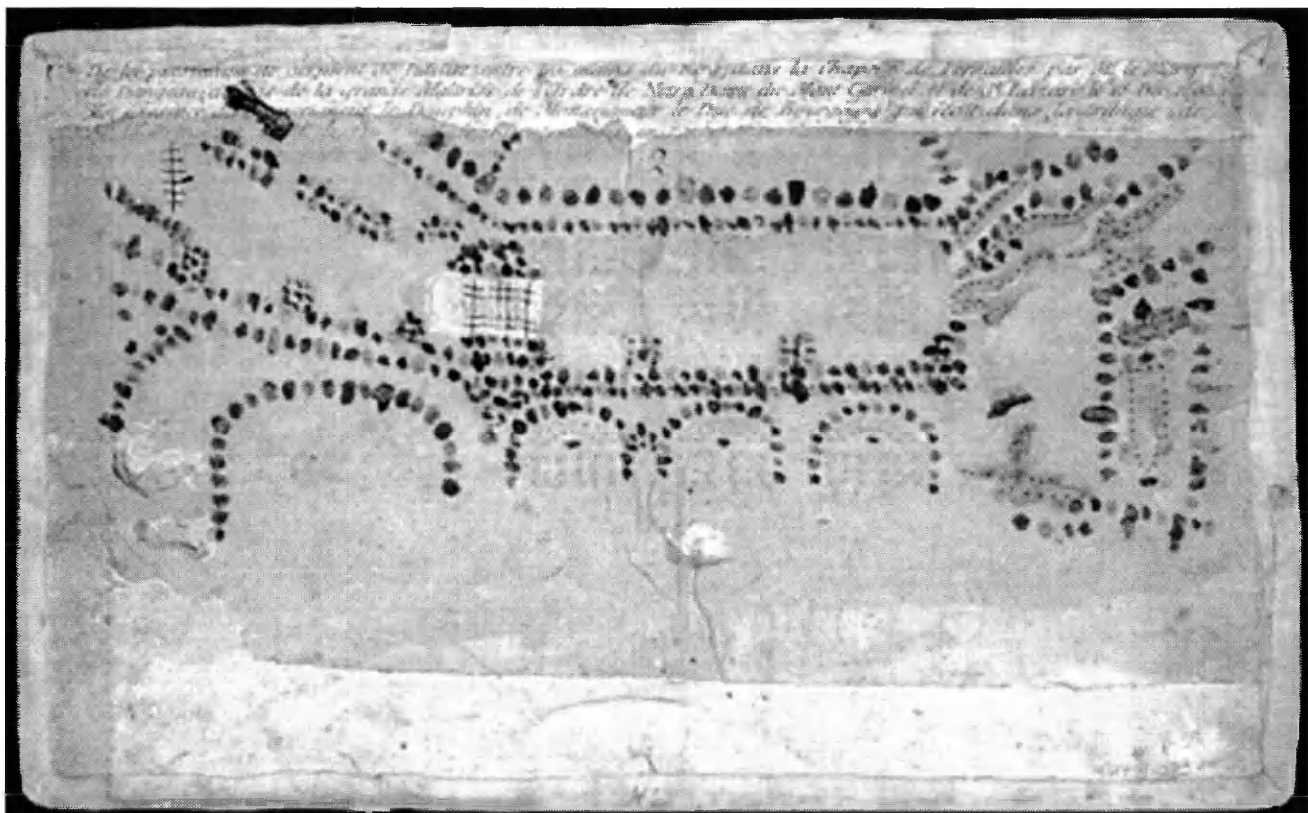
FIGURE 14

Detail of <u>Perspective</u>. Plate 1, fig. 7, no. 2, in Denis Diderot, <u>Recueil de Planches, sur Les Sciences, Les Ats Liberaux, et Les Arts Mechaniques</u>. Vol. V. Paris, France. 1767. Courtesy, CWF.

FIGURE 15

L'Optique. Engraved by François Cazenave after a painting by Louis-Leopold Boilly. France. Ca. 1800. Black-and-white stipple engraving with aquatint. Courtesy, CWF, 1959-85.

FIGURE 16

Verso, <u>De la Prestation de Sermant de fidelite entre les mains du roy, dans la chapelle, de Versailles</u>. Engraver unknown. Probably Paris, France. C. 1775. Hand-colored line engraving with etching. Courtesy, CWF, G1971-2825.

FIGURE 17
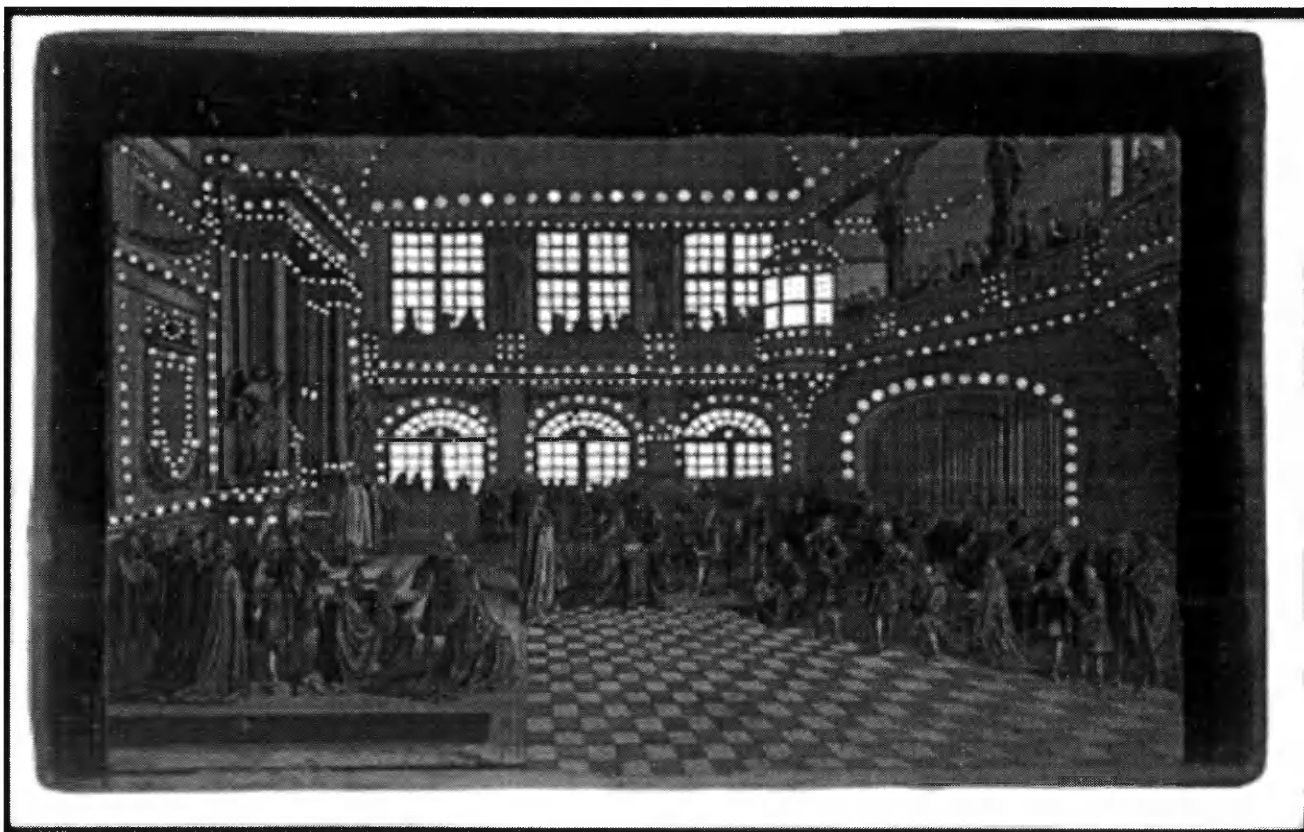
Front, backlit, <u>De la Prestation de Sermant de fidelite entre les mains du roy, dans la chapelle, de Versailles</u>. Engraver unknown. Probably Paris, France. C. 1775. Hand-colored line engraving with etching. Courtesy, CWF, G1971-2825.

FIGURE 18

Stereoscope and Stereographs. Maker unknown. Cards published by Underwood & Underwood and Keystone View Company. America. Ca. 1895. Wood, brass, steel, glass; paper photographic prints, cardboard, and ink. Courtesy, CWF, 1987.1200.1, 1-31.

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VITA

Laura Pass Barry

Laura Pass Barry was born June 30, 1971, in Harrisburg, Pennsylvania. She graduated from Cumberland Valley High School in Mechanicsburg, Pa., June 1989, and received her B.A. in Art History from The College of Wooster, Wooster, Ohio, May 1993. She received honors on her senior thesis, "Iconographical Development in Edward Hicks's Peaceable Kingdoms." At graduation, she was awarded the Netta Strain Scott Prize in Art History.

After working in advertising for Rite Aid Corporation, Camp Hill, Pa., Ms. Barry took a position working in Publicity and Promotion for the Museum of Modern Art, New York. In November 1994, she was hired by the Abby Aldrich Rockefeller Folk Art Museum, Colonial Williamsburg, to research and prepare a large-scale traveling exhibition and book on Edward Hicks. Three years later, she began work with the graphics collection at Colonial Williamsburg, subsequently becoming Assistant Curator of Prints, Maps, and Wallpaper. She attended the Early Southern History and Decorative Arts Summer Institute co-sponsored by the University of North Carolina, Greensboro, NC, and the Museum of Early Southern Decorative Arts, Winston Salem, NC, in summer 1999, and The Attingham Summer School, Middlesex, England, in summer 2002. She was promoted in June 2003 to Associate Curator.