Vermeer, elusiveness, and visual theory*

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Unlike some painters whose texts as well as images testify to their serious interest in the complexities of vision, Johannes Vermeer left only the evidence of his paintings.[1] They record his exceptional attentiveness to optical phenomena, as has been repeatedly recognized in the literature about him.[2] Vermeer was not alone in his intensified interest in vision. During the seventeenth century, often called the Age of Reason, active investigation of the visual realm characterized several fields. Lens makers and scientists invented viewing aids that expanded sight far beyond its normal limitations, artists produced more works that take the relativity of vision into account, and natural philosophers so fundamentally reinterpreted the process by which seeing takes place that historians of science regard the new ideas as the start of modern visual theory.[3] At times the invention of new visual aids impacted imagery and expanded the range of naturalistic depictions to include what had previously been impossible to see. Dutch lens makers working around 1600 usually receive credit for the two technological inventions that permitted the observation and depiction of objects previously too minute or distant to be seen.[4] In Delft itself, for example, Antonie van Leeuwenhoek peered through the newly invented microscope (in fact, he himself built the ones he used), and drew spermatozoa, cork cells and other equally minuscule objects never before seen. Galileo drew lunar craters with the aid of the newly invented telescope, and thereby heretically contradicted the accepted belief in the unchanging perfection of the heavens. Vermeer likewise turned to a visual aid, the recently modified camera obscura, to study an aspect of the visual process that remains biologically inaccessible to unaided eyes. Although a substantial literature exists about Vermeer and the camera obscura, this specific use has not been discussed.

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1 For a seventeenth-century example of an artist who wrote and even published art theory see C. Brusati, *Artifice and illusion: the art and writing of Samuel van Hoogstraeten*, Chicago & London 1995, esp. chs. 5 and 6. For a survey: M. Kemp, *Science of art: optical themes in western art from Brunelleschi to Seurat*, New Haven 1990.

2 See, for example, H. von Sonnenberg, "Technical comments," *The Metropolitan Museum of Art Bulletin* 31 (1973), nr. 4, pp. 220-28; E.M. Gifford, "Painting light: recent observations on Vermeer's technique," in I. Gaskell and M. Jonker (eds.), *Vermeer studies*, Washington (National Gallery of Art) 1998, pp. 185-200; and J. Wadum, "Contours of Vermeer," in ibid., pp, 201-24,. Also A. Wheelock, *Vermeer and the art of painting*, New Haven & London 1995, p. 55, and p. 111 about creative departures.

3 For studies of vision see D.C. Lindberg, *Theories of vision from al-Kindi to Kepler*, Chicago 1976; D. Park, *The fire within the eye: a historical essay on the nature and meaning of light*, Princeton 1997; N.J. Wade, *A natural history of vision*, Cambridge (Mass.) & London 1998; M.H. Pirenne, *Optics, painting & photography*, London & New York 1970.

4 H. King, *The history of the telescope*, London 1955. R.S. and C.T.H. Clay, *History of the microscope*, Huddersfield 1977. It is uncertain who invented the telescope around 1600 (reinvented, perhaps, because Leonardo wrote in his journal about making one) but Hans Lippershey, a Dutch eyeglass maker caused it to become widely known in 1608, which prompted Galileo to acquire his own telescope. Credit for the first microscope around 1595 often goes to another Dutch eyeglass maker, Zacharias Janssen. For succinct discussion of interest in vision-expanding technologies see M. Westermann "Vermeer and the interior imagination," in A. Vergara, exhib. cat. *Vermeer y el interior Holandés*, Madrid 2003, pp. 226-27. Standard biographies of the philosopher Baruch Spinoza only mention that he ground lenses. He was an exact contemporary of Vermeer, and earned a living in and near Amsterdam by grinding lenses as well as making telescopes and microscopes; see L. Browne, *Blessed Spinoza*, New York 1932, and R. Kayser, *Spinoza; portrait of a spiritual hero*, New York 1946, as cited in http://www.europa.com/~telscope/tsholland.txt. Two other instruments also invented in the seventeenth century, the thermometer and barometer, likewise permitted measurement of changes otherwise too minute to quantify.

REVISITING THE CAMERA OBSCURA TOPIC We turn once again to Vermeer's disputed relationship with the camera obscura, but from a different perspective. Unlike the microscope and telescope, both invented at the start of the seventeenth century, some form of the camera obscura had existed for centuries. In the 1550s this viewing apparatus became equipped with a lens and in the 1580s with a mirror that righted the inverted projection and increased the camera's functional range.[5] Thus improved, the box (or enterable enclosure) could finally project a clear image through the aperture on one side to a surface for receiving the projected image on the other. Young artists could turn to it for "knowledge of nature," as Samuel van Hoogstraten advised in 1678, but so could established scientists, as when Kepler used one to study sunspots or a solar eclipse. In addition, a camera obscura offered seemingly magical entertainment when it projected the ongoing life in an open area of public activity into a separate darkened space. Samuel van Hoogstraten witnessed such displays in Vienna, London, "and in other places as well."[6]

If Vermeer shared the interest in a camera obscura he may have been prompted by the camera's modernity and prestige as a vehicle for study of the natural world, especially vision.[7] For these same reasons he may have respected its limitations and even distortions as authoritative and thus worth exploring in his paintings.[8] Not least important, he may have felt an aesthetic attraction to the visual effects themselves.

No firm evidence proves that Vermeer owned or even had access to a camera obscura of the new type.[9] According to the dominant argument, the paintings themselves supply the persuasive data, because they include all the visual effects that are standard in images projected by a camera obscura. In a reduced, flattened and softened version of the scene the hues and values become intensified, discs of light (commonly known as discs of confusion) appear on shiny, strongly illuminated surfaces that lie beyond the central area of focus, and objects recede in space without the size constancy we automatically impose because we know their actual size. As has been pointed out, exceptionally alert eyes can notice the latter effects even without a camera obscura.[10] Here, however, the focus will be on optical data that remain biologically inaccessible to even exceptionally perceptive but unaided eyes.

The camera obscura's limited depth of field and its consequent inability to bring the whole scene into focus simultaneously was a technical limitation of the available models, but this constraint could be turned into an advantage. Because of the clarity with which we see our surroundings we tend to ignore the fact that only one area appears in sharp focus at any moment: that at which we are looking directly. Accommodation in the shape of

5 Images cast through a pinhole had apparently already been studied in China since the fifth century BC, and the mechanism had been known in principle to Aristotle. The camera acquired its standard form between about 1490, when Leonardo used one, and the end of the sixteenth century. See J. Hammond, *The camera obscura: a chronicle*, Bristol 1981. For a good summary of its development see P. Steadman, *Vermeer's camera: uncovering the truth behind the masterpieces*, Oxford 2001, ch. 1. For a useful website about the camera obscura that compiles data from various sources see http://www.acmi.net.au/AIC/CAMERA_OBSCURA.html.

6 Quoted and discussed by Brusati, op. cit. (note 1), pp. 70-74.

7 M. Westermann, *Johannes Vermeer*, Zwolle 2004, p. 42, stresses the modernity. For the reputation of the camera obscura see A. Wheelock, "Constantijn Huyghens and early attitudes towards the camera obscura," *History of Photography* 1977, pp. 93-103.

8 Oral communication from R. Lieberman, a photographer and art historian. See also Steadman, op. cit. (note 5), p. 159.

9 For arguments in favor of Vermeer's use of a camera obscura see C. Seymour Jr, "Dark chamber and light-filled room: Vermeer and the camera obscura," *The Art Bulletin* 46 (1964), pp. 323-31; D. Fink, "Vermeer's use of the camera obscura: a comparative study." *The Art Bulletin* 53 (1971), pp. 493-505; and especially Steadman, op. cit. (note 5), pp. 39-43 and 135-65. For a contrary position see J. Wadum, "Vermeer in perspective," in A. Wheelock (ed.), exhib. cat. *Johannes Vermeer,* The Hague (Royal Cabinet of Paintings, Mauritshuis), Washington (National Gallery of Art) & Zwolle 1996, pp. 67-79; J.-L. Delsaute, "The camera obscura and painting in the sixteenth and seventeenth centuries" in Gaskell and Jonker, op. cit. (note 2), pp. 111-24, and A.A. Mills, "Vermeer and the camera obscura: some practical considerations," *Leonardo* 31 (1998), pp. 213-18. Expressing moderate skepticism about Vermeer's use of a camera obscura, W. Liedtke, exhib. cat. *Vermeer and the school of Delft*, New York (Metropolitan Museum of Art) 2001, pp. 125-26, 155-56, emphasized the presence of camera-like effects in works by other artists, namely rounded highlights in still lifes by Willem Kalf and sharp contrasts in scale in architectural scenes by Gerrit Houckgeest. The sparse external evidence permits no firm conclusion. No camera obscura appears in the inventory compiled after Vermeer's death, but as Philip Steadman noted, the only permanent part of a tent-type of camera obscura would have been its lens, a small object easily hidden by a widow saddled with debts.

10 For example, W. Liedtke, "Vermeer teaching himself," in W. Franits (ed.), *The Cambridge companion to Vermeer*, Cambridge 2001, p. 30.

our lenses enables our eyes to refocus constantly as they scan different objects in the field of view, and this ongoing accommodation gives the illusion of a uniformly sharp environment. All that lies on the periphery of our visual field can only be glimpsed, as Benedetto Castelli described in 1639. "When we focus the eye on some object in order to see it, we see it well and distinctly, while we see other objects near it with some confusion."[11] The neurobiologist Mary Livingston straightforwardly summarized that central vision is clear and grasps details whereas peripheral vision is blurred and better at seeing "big things," that is, general shapes.[12] The fact that a camera obscura does not refocus automatically but retains its original focus until someone makes an adjustment would have enabled Vermeer to do the normally impossible. With healthy unaided eyes we cannot look directly at a nearby form and see how it appears when out of focus (unless we squint, which distorts vision in other ways).[13] The limited focal depth of a camera obscura meant that it inevitably left part of the projection unfocused. As a result, an image projected by a camera obscura includes the equivalent of central as well as peripheral vision. By working with a camera obscura Vermeer had at his disposal two types of lens through which he could look simultaneously, that on the camera and those on his own eyes. They could be focused independently and on different objects. With his sight thus artificially expanded he could examine the appearance of objects while they stayed unfocused. Furthermore, he could compare how that appearance changed as he adjusted the focus. Equipped with the data gained from such observations, he could choose where, if anywhere in his painting he wanted one or more areas with distinctness like that of central vision, and where he preferred the blurring characteristic of peripheral sight. Given the flexibility of his recreation of these visual effects, artistic considerations played at least as substantial a role in his decisions as a quest for optical accuracy. Vermeer did not need this viewing aid to see forms distinctly, but it was biologically impossible for him to study the appearance of unfocused forms without a lens that could be adjusted, the type of lens that formed part of the improved type of camera obscura.

PAINTED IN DETAIL If any part of a painting by Vermeer includes sufficient detailing to be described as in focus, it tends to coincide with an illuminated section of the back wall, where most viewers do not consciously notice it (in fig. 4, for example). Despite craquelure and other changes in the paint surface itself, the nuanced topography of such walls can be made out. Some scholars have remarked on the surprising distinctness of nails and nail-holes on rear walls, for example Daniel Fink, Hans Wetering and Nanette Salomon.[14] Background detailing in *The milkmaid* (fig. 2) also caught the attention of the cataloguer who described the paintings scheduled to be auctioned in Amsterdam on 12 April 1813. He wrote "she seems to pour milk from an earthenware jug; on the wall, where the hammered-in nails are visible in a very artful and natural way, hangs a little basket and a brass bucket."[15] Nothing hangs from the most legible nails, which emphasizes their presence. When Jørgen Wadum described the space in fig. 2 and *Woman holding a balance* (Washington, National Gallery) he noted that such "walls, with all their flaking plaster and nail-holes, were rarely seen in other seventeenth-century paintings with bourgeois interiors."[16] When other genre painters did include nails, nail-holes and even cracks on walls of burgher interiors, the results differed from Vermeer's in an important way. Jan Steen, Gabriel Metsu, Caspar Netscher and others gave equal clarity to the main figures, or even to the whole scene. For instance, in Netscher's *The lacemaker* (1662; London, Wallace Collection) the nails and cracks on the

11 Quoted in Wade, op. cit. (note 3), p. 339.

12 M. Livingston, *Vision and art: the biology of seeing*, New York 2002, pp. 68–77. Livingston reports that she finds more stimulating material for her neurobiological research in paintings than at her professional conferences.

13 My thanks for this observation to Steve Levin, an artist and colleague at Williams College.

14 Fink, op. cit. (note 9), pp. 493–505, esp. p. 496, noted that the rear wall is often in focus. However, his general conclusion that Vermeer painted directly from a camera obscura is untenable. Hans Wetering's observation is referenced by Wadum, op. cit. (note 2), p. 209, note 40. Nanette Salomon pointed out the nail-holes at *Vermeer to eternity: time and the image in historical, theoretical, and aesthetic frames*, a colloquium she and Griselda Pollock organized at the Clark Art Institute, Williamstown, on 5 and 6 March 2004.

15 A. Blankert, J. Montias and G. Aillaud, *Vermeer*, New York 1998, p. 175: "...zij uit een aarden Kan melk schijnt te gieten, aan den Muur, waarop zeer kunstig en natuurlijk de ingeslagen spijkers zigtbaar zijn, hangt een Mandje en Koperen Emmer."

16 Wadum, op. cit. (note 2), p. 209.

1 Johannes Vermeer, *Officer and laughing girl*. New York, The Frick Collection

back wall look as detailed as the nail-heads in the floorboards in the foreground. Likewise in Metsu's *Lady reading a letter with her maidservant* (Dublin, National Gallery of Ireland), the thimble fallen onto its side in the foreground stands out as distinctly as the topographic features of the rear wall.

Vermeer's paintings do not stay consistent with the sequence of gradations visible in projections by a camera obscura, however, for artistic license coexists with accuracy in his works. Even when walls are detailed, the maps that hang on them vary in precision. For example, in *Woman in blue reading a letter* (Amsterdam, Rijksmuseum) the map looks unfocused. In *Officer and laughing girl* (fig. 1), however, as James Welu observed in his essay about Vermeer's cartographic sources, "if Vermeer did use a camera in *Soldier and laughing girl*, his extremely detailed rendering of the Blaeu-van Berckenrode map suggests that the map served as one of his main points of focus."[17] Though not quite in focus, that map looks highly detailed when compared with the brightly illuminated young woman seated in front of it. Her unfocused form cannot be seen clearly, and discs of

17 J.A. Welu, "Vermeer: his cartographic sources," *The Art Bulletin* 57 (1975), pp. 529-47.

2 Johannes Vermeer, *The milkmaid*. Amsterdam, Rijksmuseum

confusion add a sprinkling of gleaming abstraction.

Not one of the more than a dozen and a half framed pictures hanging on the back walls includes detailing comparable to Vermeer's most detailed walls and maps, however. Comparison of a known original, the so-called *Procuress* (Boston, Museum of Fine Arts) by Dirck van Baburen, with Vermeer's quotation of it in two paintings, highlights the strong reduction in naturalism. Similarly, *Lady writing a letter with her maid* (fig. 4) includes a monumental but greatly abstracted narrative picture (*The finding of Moses*) that hangs from the same wall that has sharply detailed nail-holes just below. Being indistinct, the picture-within-the-picture retained its associational capacities without having sufficient detail to distract attention from the main human subject. Furthermore, turning the framed pictures into flattened patterns similar to those of his maps and tapestries reaffirmed the back wall as a reference plane.[18] That Vermeer changed the size and shape of the pictures hanging on the back wall to suit their context provides further evidence of artistic license. The most striking example is the *Finding of Moses* that is huge in fig. 4 and small in

18 Wheelock, op. cit. (note 2), p. 111, notes that Vermeer abstracted all objects of great complexity.

The astronomer (Paris, Louvre) even though it hangs closer rather than further away.

Whereas other seventeenth-century painters met the expectations of viewers as to which parts of a scene would have greatest legibility (fig. 6, for example), Vermeer did not.[19] Since the late 1650s his choices as to what he showed clearly and what indistinctly started to become unusual, perhaps unique. This untraditional reversal of optical hierarchy became more noticeable after art history increasingly absorbed some Deconstructionist ideas as a viable supplement to other methodologies. Exploring an aspect of a work that does not seem to make sense, such as the misplacement of clear detailing, no longer seems an unusual procedure.

THE UNFOCUSED FOCUS In Vermeer's oeuvre of about 35 works, women remain the favored subjects, as has been repeatedly recognized. They far outnumber men.[20] Among the existing genre scenes, a woman unaccompanied by a child is the sole figure in 16 or 17 (depending on attribution) of the surviving examples, but a man in only two.[21] In scenes with a heterosexual cast the men's attention focuses on the woman in seven of the eight examples. Infrared reflectography revealed that the musician in *A lady with a gentleman at the virginals* (London, The Royal Collection) originally turned her head towards her male companion, and the mirror still disconcertingly reflects her previous position.[22] Now the woman's head faces forward, at a right angle away from him. Only in one early work, *Officer and laughing girl* (fig. 1), does the woman meet the man's gaze, and even here the soldier's body serves as a dark repoussoir that draws attention to her bright but indistinct presence.[23]

Occasionally Vermeer reinforced this emphasis by locating the vanishing point on the woman, or almost on her. Where the orthogonals of linear perspective do converge on, or almost on a woman, they emphasize what she is doing. A vanishing point marks the sleeve of a woman playing the virginal in two paintings (*A young woman standing at a virginal,* London, National Gallery, and *A lady at the virginals with a gentleman,* London, The Royal Collection), and falls on the forearm of a maid handing a letter to her surprised mistress (*Mistress and maid,* New York, Frick Collection). One also lies next to a hand pouring milk, balancing scales (right near the extended little finger), or holding a trumpet. In some cases the location of the vanishing point is visibly marked by a pinhole pierced through the canvas. Disconcerting to notice, a pinhole pierces the left eyelid of the mistress who is looking down at the letter she is writing in *Lady writing a letter with her maid* (fig. 4). Despite these examples, linear perspective does not focus on women proportionately more often than on men, however, and sometimes leads away from the woman (*Maid and woman with a letter*, Amsterdam, Rijksmuseum).[24] Another method of drawing attention to an area, in addition to our interest in human beings and the

19 D. Arasse, *Vermeer: faith in painting*, Princeton 1994, pp. 73, 81, proposed a religious interpretation of the blurring. "What he kept of it [the camera obscura] was, in painting, a painterly effect, a blurring that evoked 'scientifically,' and manifested pictorially, the invisible in the visible." For Arasse, this carries Catholic implications, the dogma of "the mystical union of the visible and the invisible."

20 Numerous publications discuss Vermeer's predilection for the subject of women, among them L. Gowing, *Vermeer*, New York & London 1970. L. Vergara, "Women, letters, artistic beauty: Vermeer's theme and variations," in P. Sutton (ed.), exhib. cat. *Love letters: Dutch genre paintings in the age of Vermeer*, Dublin (National Gallery of Ireland), Greenwich (Bruce Museum of Arts and Science) & London 2003, pp. 50–62, wrote on p. 58 that "one of the most noticeable consistencies of his oeuvre is an artistic devotion to women. The surviving works picture about four times the average proportion of women to men in European painting of the era, including Dutch painting." A numerical count of women is provided by Franits, op. cit. (note 10), p. 4.

21 Jon Boone summarized the documentary evidence about missing paintings, which include a self-portrait and a genre scene "in which a gentleman is washing his hands in a see-through room with sculptures, artful and rare, by ditto [Vermeer]." See http://essentialvermeer.20m.com/how_many_vermeers.htm
His only two surviving paintings of a man alone, *The geographer* (Frankfurt, Städelsches Kunstinstitut) and *The astronomer* (Paris, Louvre), both depict a scientist with materials appropriate to his profession.

22 Wheelock, op. cit. (note 2), p. 95. In the *Woman reading a letter at an open window* (Dresden, Staatliche Kunstsammlungen, Gemäldegalerie) Vermeer likewise left the reflection in window panes after he turned the woman's head. Because the reflection does not correspond to the current placement of the head, the scene is a bit strange, and the reflection is harder to take for granted.

23 The sole exception may be the *Concert* (Boston, Isabella Stewart Gardner Museum, stolen) in which the man, seen only from the back does not seem to be looking up at the woman who is beating time.

24 Since Vermeer structured his space with traditional linear perspective, Jørgen Wadum has argued, he did not need a camera obscura for this task; see Wadum, op. cit. (note 9). In addition to structuring space, however, linear perspective can play an additional structural role. Combining linear perspective with focusing that suggests a camera's projection introduces a complication within the composition, another possibility of disjunctive foci.

3 Johannes Vermeer, *The lacemaker*. Paris, Musée du Louvre

placement of a vanishing point, is through optical focus.[25]

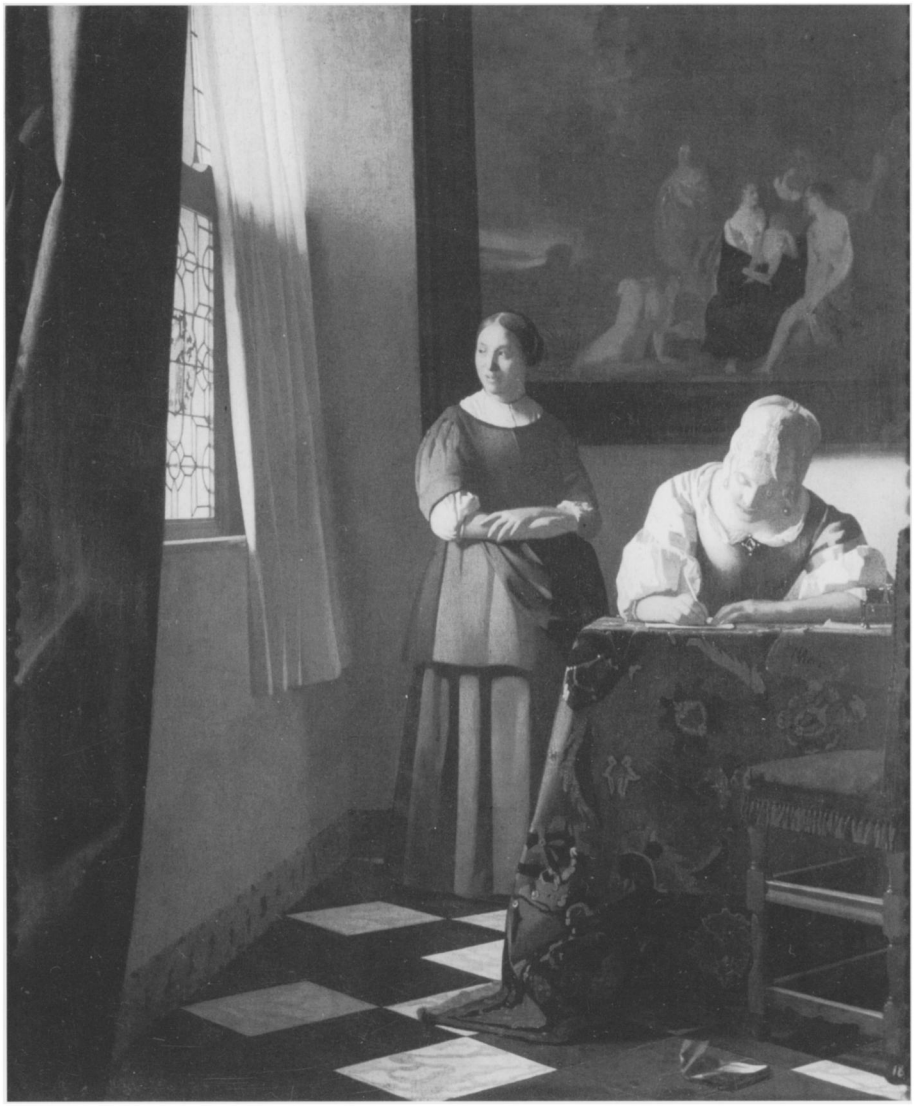
From the end of the 1650s Vermeer's paintings begin to confront observers with a visual contradiction. Compositionally and thematically they concentrate on a woman, yet present her and the adjacent area as optically out of focus. Identifying a depicted object as deliberately looking unfocused turns out to be harder than expected, perhaps because we have grown accustomed to brushwork that ranges from virtually invisible *feinmalerei* to strokes which protrude tangibly from the canvas. As a result, discrepancies can exist in descriptions of the same image even among art historians known for their perceptive writing about Vermeer. For example, about the small painting of *The lacemaker* (fig. 3) Arthur Wheelock wrote that "by recreating this optical phenomenon, where forms situated nearest the eye appear diffused and unfocused, Vermeer pulls the viewer close to the picture plane. At the same time, these diffused forms encourage the eye to pass over the foreground and to focus on the clearly defined middle ground, consisting of the lacemaker herself."[26] About the same painting, Celeste Brusati wrote that "he concentrated the greatest optical ambiguity on the figure itself, insisting that we see disjointed flat patches of color where we would most hope and expect to find a seamlessly modeled hand, arm, or face."[27] My descriptions of focusing in Vermeer's paintings are based on comparison with images projected by a home-made camera obscura, varying levels of detailing within the painting, and the presence of discs of confusion, a recognized indicator that an object is to be interpreted as not being in focus.

In depicting women, Vermeer did not articulate details, and sometimes sprinkled discs of confusion on hair or clothing, including shadowed locations and dull surfaces where they could not appear in reality (the shoulder of the woman in fig. 1, for instance). An unfocused effect also characterizes the women in the few examples with a dark background or only a head and shoulders. For instance, despite the immediacy of the expression and spatial closeness of the portrait-like woman in *Girl with a pearl earring* (The Hague, Mauritshuis), the soft generalization of her forms makes her seem distanced. The presence of a detailed section of background accentuates her indistinctness. For example, in the late *Lady writing a letter with her maid* (fig. 4), the most important figure, the absorbed mistress who sits writing at a table near the foreground looks abstracted, and her elaborate cap would be impossible to reconstruct from the spots and dabs of light and shadow. The folds of her unfocused dress sharpen into crystalline angles, but not into details. Yet the sunlit part of the back wall behind her has distinct holes where nails once protruded. Similarly, just below the artist's signature in *The lacemaker*, the back wall is clearly punctured by the trace of a nail's former presence, complete with a bit of lost plaster

25 Linear perspective, optical focusing and human presence all create centers to which attention is automatically drawn, but in Vermeer's paintings all three never work in synchrony. Linear perspective sometimes reinforces the importance of the human subject, but optical focusing never does.

26 Wheelock, op. cit. (note 9), p. 176.

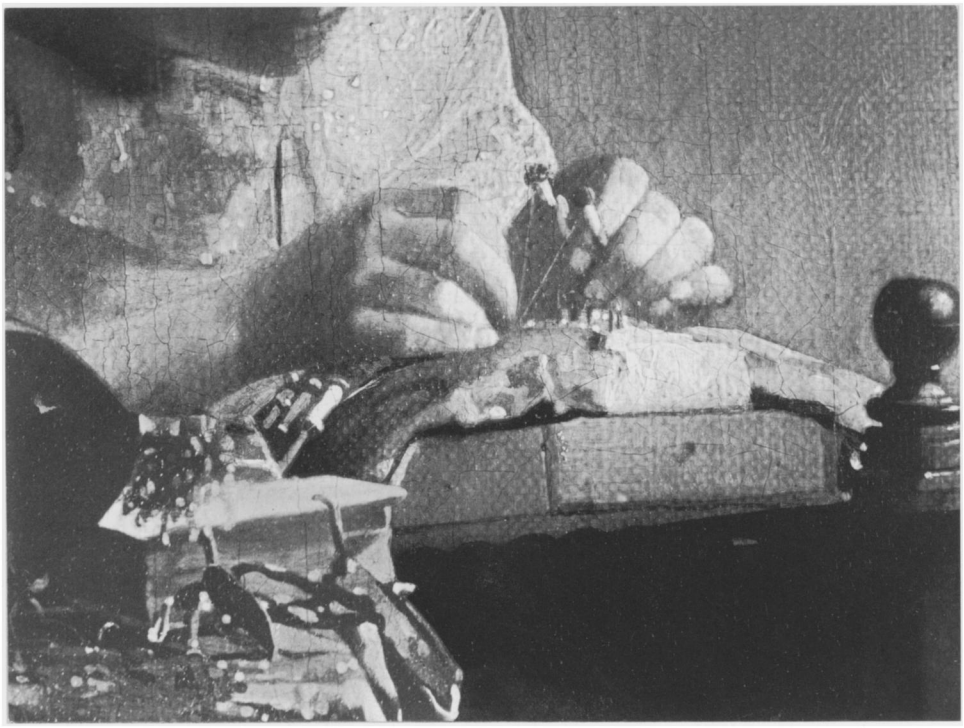
27 C. Brusati, *Johannes Vermeer*, New York 1993, p. 3 (unpag.).



4 Johannes Vermeer, *Lady writing a letter with her maid*. Dublin, National Gallery of Ireland

(fig. 3). The absorbed lacemaker seated in front of this detailed wall appears softly generalized, and the colored threads in the immediate foreground look so unfocused that they could be compared with Jackson Pollock's dribbles (fig. 5).

When other artists used selective blurring, they did so to designate objects as distant or insufficiently lit, or as having a subordinate role in the scene. As a result, blurring occurs in backgrounds rather than foregrounds, and with the supporting cast rather than the leading figures. For instance, Gerard ter Borch's portrayals of well-to-do young women have been compared with Vermeer's in the tendency to narrative ambiguity, but the painter from Deventer consistently concentrated both his delicately detailed paint handling and his compositional attention on the main figure or figures (fig. 6). Through shadows and blurring he obscured secondary areas to highlight his main subject, often an elegant young woman dressed in shimmering white satin.[28] By contrast, Vermeer did something oxymoron-



5 Detail of fig. 3

ic in a number of his works when he painted his iconographic focus as out of focus. His works would look quite conventional if he had recreated the indistinctness typical of peripheral focus in peripheral areas of the scene. Instead, he unprecedentedly relegated any clearly detailed section to the scene's spatial periphery and located the indistinctly painted parts in prominent locations, where they cannot be overlooked. Consequently, his human subject looks as if seen through peripheral vision, whereas the clarity of central vision, if included, remains fixed on some ostensibly insignificant area.[29]

The misplaced blurring cannot be attributed to the camera's technical limitations or the model's physical limitation. Daniel Finck argued the latter when he questioned why the still life elements (which for him meant all inanimate sections) often have greater detail than the human figure, and concluded that this resulted from the physical inability of models to remain totally still, no matter how stable their pose. As a result, the artist could not paint humans with the same clarity as the completely immobile sections.[30] Although inanimate objects do sometimes look detailed, they often look as indistinct, or even less distinct than the woman, a case in point being the lacemaker's threads (fig. 5). The undetailed depiction of human beings also cannot be traced to the technical inadequacies of the early versions of a camera, because Vermeer used the data it provided with great flexibility. He had the option of refocusing or of moving the model (or the camera) so that the woman would be positioned where the lens could be sharply focused on her. His unconventional distribution of distinct and indistinct areas therefore must have resulted from choice

28 Allison Kettering, "Ter Borch's ladies in satin," in W. Franits (ed.), *Looking at seventeenth-century Dutch art*, Cambridge 1997, pp. 98-115.

29 Since human brains contain a center that focuses on recognizing faces, stylization there stands out as artificial more than equal stylization of other objects. With Vermeer, however, the objects adjacent to the woman and in the same spatial plane generally have the same level of stylization as her face.

30 Fink, op. cit. (note 9). p. 502. This section of his essay is titled "Relative detail in still-life portion versus figure detail."

and not from the biological limitations of models or the technical limitations of a camera obscura.

Vermeer placed the observer in a disconcerting relationship to the woman who usually embodies the thematic and compositional heart of the picture. Being indistinct, she seems to be glimpsed with peripheral vision while the viewer looks at something else. To bring her into focus feels like grasping with one's sight, being visually there (as earlier theories of vision posited), but a woman in Vermeer's paintings seems just out of visual reach.[31] Her unfocused appearance also carries implications of time, because it suggests the observer is no longer, or not yet looking directly at her. Nevertheless, her placement within the space, our instinctive interest in other human beings, and sometimes the gaze of a male companion, all keep her a center of attention. In the presence of such conflicting visual signals an observer feels simultaneously drawn to the woman and kept distanced.

An unfocused camera obscura could easily have provided Vermeer with the initial experience of seeing his model as less distinct than a less significant area, and this unfamiliar sight prompted him to explore the expressive possibilities of a deliberate reversal of conventional priorities. By including various effects associated with the camera obscura Vermeer invited comparison between his works and the "living paintings" this viewing apparatus projected. His scenes, however, look as if the lens needs resetting to bring the featured woman into focus. Unable to get a clear look at her and her immediate surroundings (even though the back wall may be distinctly rendered), an observer feels as if the whole scene stays locked into someone else's optical priorities. "Elusive," the adjective often applied to Vermeer's paintings, is apt for such a situation.

NEW INTERPRETATIONS OF THE VISUAL PROCESS

When Europeans talked about vision in the 1600s they often relied on analogy with the camera obscura. In fact, from the late sixteenth century until the end of the eighteenth this viewing apparatus remained the dominant paradigm for describing and examining the process of vision.[32] A case in point can be found in René Descartes's *Discourse on method*, published in 1637 in Leiden: "Neither can we doubt that the images which we cause to appear on a white cloth in a dark chamber are informed there in the same way and for the same reasons on the back of the eye."[33] Vermeer may have been aware that the camera obscura commonly served as an analogue for the functioning of the eye, and given his abiding interest in optical effects this would have enhanced its attraction as an observational tool.[34] Although a camera obscura became an additional observational tool for Vermeer, he did not limit himself to what he saw through it.[35] Instead, he used its visual data selectively as well as flexibly, combining uncanny accuracy with artifice, especially in his late paintings.

Prior to the seventeenth century, the writers who compared the functioning of the eye to the camera obscura did not follow the implications of their analogy to its logical conclusion. Rather than question if the lens of the eye likewise mechanically projects an image unto another surface, they still accepted that the front surface of the eye, the visible lens itself, both receives the image and makes sense of it. In 1604 Johannes Kepler corrected this misinterpretation. Although in presenting his ar-

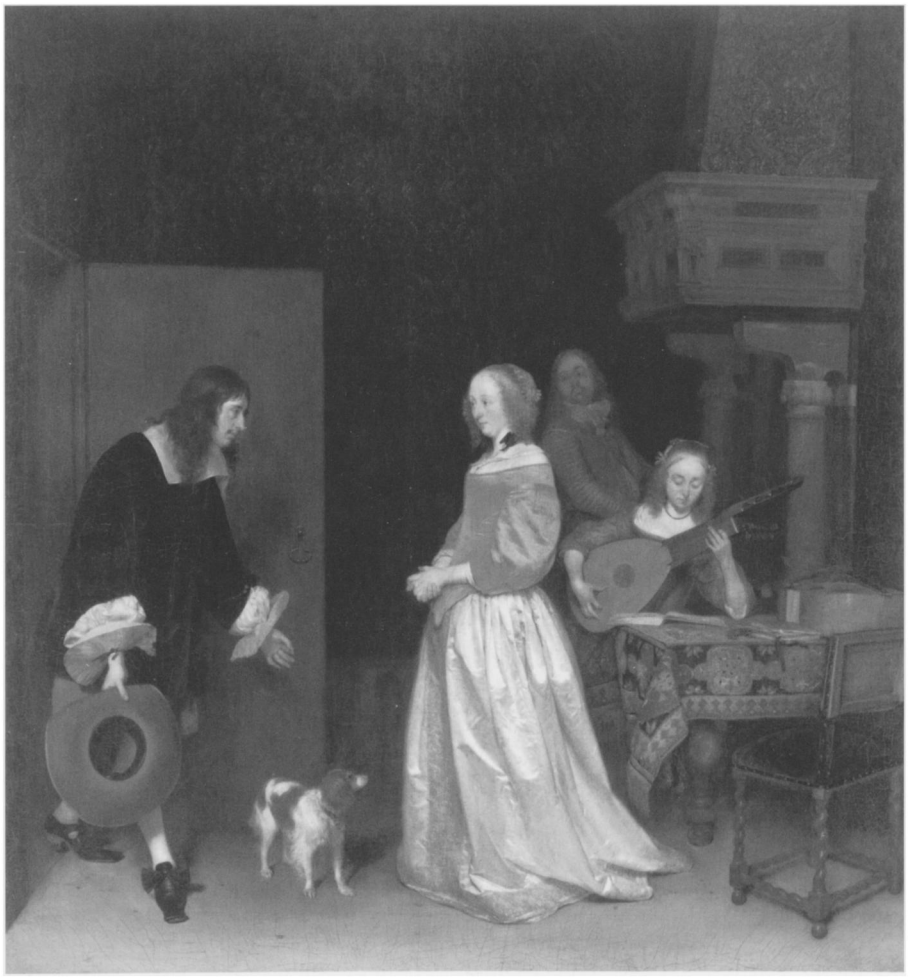
31 The metaphor of touch is a leftover from earlier extromission theories of vision, which held that rays move from the eye to the objects being viewed. In addition to her lack of crisp detailing, the woman is distanced in various other ways. Gowing, op. cit. (note 20), p. 34, wrote that "veritable fortifications" of objects often block smooth access to her. Wadum, op. cit. (note 2), p. 72, posited that Vermeer used a low horizon line "in order to keep the spectator at a distance." In the same collection of essays, p. 78, Wheelock observed that a close vantage point combined with a low horizon line makes the woman "seem comparatively small and distant."

32 J. Crary, *Techniques of the observer: on vision and modernity in the nineteenth century*, Cambridge (Mass.) 1992, p. 27. For a survey of optical issues in art from the Renaissance through the nineteenth century see Kemp, op. cit. (note 1).

33 Quoted in Wade, op. cit. (note 3), p. 28.

34 Although I draw on the same visual theorists that Svetlana Alpers used to distinguish between Dutch and Italian painting in *The art of describing*, Chicago 1983, ch. 2, my purpose is to bring out specific aspects of Vermeer's optical observations, not to characterize Dutch art in general.

35 Philip Steadman's recreation of the basic architectural configuration of the spaces in ten paintings looks convincingly close, and Vermeer may well have used a camera obscura to recreate a more optically accurate spatial recession than can easily be done with just linear perspective. If so, he also felt free to introduce changes in the pattern of the floor and wall tiles, as well as the shaping and decoration of window-panes, elements that would have remained constant in the actual room; see Steadman, op. cit. (note 5). It would be too dark to paint within the darkened space needed to see the camera's projection, but it would be possible to trace and to observe.



6 Gerard ter Borch, *The suitor's visit*, c. 1658. Washington, National Gallery, Andrew W. Mellon Collection

gument Kepler did not refer specifically to the camera, he knew it well because he had used one in a public square for astronomical observations, and even provided written directions on how to set up a room so it could function in this capacity.[36] In contrast to what previous theorists posited, Kepler realized that the connection between the external physical world and seeing is not direct. He separated the visual process into two stages, and explained that the initial mechanical stage of vision occurred when the convex lens of the eye focused rays of light unto the retina. This (inverted and reversed) projected image, now known as the "real image" Kepler identified as a picture ("pictura").[37]

"I say that vision occurs when the image of the whole hemisphere of the world that is before the eye, and a little more, is set up at the white wall, tinged with red, of the concave surface of the retina. How this image or picture is joined together with the visual spirits that reside in the retina and in the [optic] nerve, and whether it is arraigned within by the spirits into the caverns of the cerebrum... this, I say, I leave to the natural philosophers to argue about. For the arsenal of the optical writ-

36 Johannes Kepler, *Optics: paralipomena to Witelo & optical part of astronomy*, trans. W.H. Donahue, Santa Fe 2000, p. 67 (ch. 2, proposition 7).

37 Park, op. cit. (note 3), p. 164.

ers does not extend beyond this opaque wall, which in fact occurs first in the eye."[38]

Historians of science identify Kepler's "pictura" as the first instance in the history of visual theory of someone interpreting a real optical image as existing independently of the observer. "By his masterful hypothesis Kepler eliminated the observer."[39] In other words, he characterized the first stage of vision as being mechanical, like a projection by a camera obscura (more about the significance of this later), but left to others the task of explaining how the upside-down and reversed images become righted and understood. Elsewhere in his writing Kepler identified this second stage as "intentional."[40]

The most influential interpretation of what subsequently happens to the retinal image came from René Descartes (1596–1650), who lived for 20 years in the Netherlands and published both his main essay on optics, *Dioptrics* (1637) and his *Meditations on first philosophy* (1641) in the university city of Leiden. He wrote the former in his native French, the latter in Latin, but neither in the Dutch spoken by his neighbors. In his second "Meditation," Descartes distinguished the mechanical stage of vision for which the camera obscura served as a model from the subsequent mental stage, which he thought took place in the brain, specifically in the pineal gland. This stage he interpreted as depending on the viewer's innate ideas and ability to recognize natural signs. For clarification he gave an everyday example. "So I may by chance... notice some men passing in the street, at the sight of whom I do not fail to say I see men,... nevertheless, what do I see from this window except hats and cloaks which might cover ghosts or automata which move only by springs. But I judge that they are men, and thus I comprehend, solely by the faculty of judgment which resides in my mind, that which I believed I saw with my eyes."[41] He concluded that it is the mind, not the eye, that sees. The two-stage model of vision that Descartes helped develop continued to be accepted until the late twentieth century, when neuroscientific research demonstrated the inadequacies of a unidirectional interpretation.

VERMEER'S PAINTINGS: A PICTORIAL COUNTERPOINT TO THE NEW THEORIES OF VISION Since we inevitably see the full package of information provided by the interactions of eye and mind, separating these out, as seventeenth-century theory posited, seems a distinction that can be made in texts but not images, least of all naturalistic images. Of course Vermeer did not picture the image projected unto the retina as distinct from its processing by the mind. Nevertheless, he took a crucial step in that direction when he separated the optical focus in his scenes from the iconographic focus. Whereas the placement of the human presence draws attention to that spot, the area of greatest legibility lies elsewhere in the scene. As Lawrence Gowing memorably described, "Vermeer seems almost not to care, or not even to know, what it is that he is painting. What do men call this wedge of light? A nose? A finger?... the conceptual world of names and knowledge is forgotten, for nothing concerns him but what is visible, the tone, the wedge of light." Gowing continued with a particularly telling observation. "Vermeer's optical impartiality becomes increasingly inflexible as it approaches crucial points in his subject matter."[42] Celeste Brusati likewise wrote that in the late works Vermeer "concentrated the greatest optical ambiguity in the figure itself, insisting that we see disjointed flat patches of color where we would most hope and expect to find a seamlessly modeled hand, arm, or face."[43] An example of an iconographically significant yet partly illegible detail is the extended hand of the smiling woman in fig. 1. Only from its context can this almost amorphous form be identified as a hand, and even then its specific action remains uncertain.

Props likewise have lessened legibility in thematically pivotal areas. For example, until microscopic examination definitely established that the perfectly balanced

38 Ibid., p. 180, quoted from Kepler, op. cit. (note 36), ch. 5, section 169.

39 Lindberg, op. cit. (note 3), p. 202. Quotation from V. Ronchi, *Optics, the science of vision*, New York 1991, p. 205.

40 Park, op. cit. (note 3), p. 162.

41 René Descartes, *Meditations on first philosophy*, trans. L. Lafleur, Indianapolis 1960, p. 89 (Meditation II:15).

42 Gowing, op. cit. (note 20), pp. 19, 22.

43 Brusati, op. cit. (note 27), pp. 2–3 (unpag.), characterized the late works as increasingly reducing his descriptive means to something like "a bare optical statement.... The oddly disjointed patterns of tones visible in many of Vermeer's late pictures ultimately destroy the descriptive transparency of the naturalistic convention his colleagues worked so hard to maintain."

scales in *Woman holding a balance* (Washington, National Gallery) contain nothing, the scene was assumed to show the weighing of gold, a common subject. Similarly, the objects placed on the table in *Woman with a pearl necklace* (Berlin, Staatliche Museen Preussischer Kulturbesitz, Gemäldegalerie) can easily be identified as a dark, piled-up tablecloth, Chinese urn, brush and comb, but the white streaked object remains undecipherable.[44] Viewers tend to deal with such ambiguities as Descartes did when he pointed out the gap between what he actually saw below his window (hats and coats) and what he concluded he saw (men walking). Vermeer set up a comparable gap when right in the iconographic center of the composition he left significant discrepancies between the forms we actually see and what we assume they represent.

Vermeer's work, however, did not depend on familiarity with the breakthroughs in theory, and his goals may have remained primarily artistic. Irrespective of whether or not he knew about the revolutionary theoretical developments, his paintings touch on aspects of seeing that loomed as central in the theoretical discourse of the seventeenth century.[45]

When Vermeer depicted the figural area as out of focus he compounded the ambiguities that result from his individual approach to subject matter.[46] The quiet domestic situations that initially seem straightforward turn out to elude being pinned down. As recent studies emphasize, the unreadability of his faces and the lack or ambiguity of narrative clues leave viewers confused about what is happening in the scenes before them.[47] While still working on a couple of pictures he even eliminated conventional iconographic motifs he had already painted.[48] Vermeer's approach can be contrasted with the use of allegory in genre images by others. Although the extent to which Dutch genre artists included allegorical levels of meaning in their works remains contested, most scholars probably accept that at least some scenes easily taken for straightforward records of everyday life should also be read on a symbolic level. Giving an object an allegorical function increases its conceptual density without altering its appearance. Vermeer proceeded in the opposite direction, and used both optical and iconographic means to subtract conceptual meaning.

Vermeer may have turned a camera obscura into an additional tool for the same basic reason as it proved relevant to the leading visual theorists. Once someone has set up the camera, its projection continues to change in response to what happens in front of the lens, irrespective of any observer being present. Furthermore, when viewers look at the projection, the clearest section may lie beyond the area that attracts their interest until someone adjusts the focus. As Celeste Brusati noted, the projected image has a dual identity, forming part of the observer's visual field but also existing independently.[49]

44 Also, the patterned rectangle at the far end of the table could easily be mistaken for a box, but as its shadow indicates, it represents the back of a chair; see J. Nash, *Vermeer*, Amsterdam 1991, pp. 101-02.

45 Antonie van Leeuwenhoek lived in Delft not far from Vermeer, and the two men may have been acquainted. Van Leeuwenhoek began his ground-breaking microscopic investigations later than Vermeer developed his characteristic style. Two art patrons known to have visited him, Balthasar de Monconys (1663) and Constantijn Huygens (around 1669), also moved in the most advanced scientific circles, and in fact Huygens had urged Descartes to publish his main text on optics, *Dioptrics*, in 1637. Their visits took place, however, too late to have served as the initial stimulus for optical observations with a camera obscura. See K. van Berkel, "Vermeer and the representation of science," in *The scholarly world of Vermeer*, The Hague 1996, pp. 13-24, esp. p. 20.

46 Here some chronologically organized quotations about his ambiguous iconography. Brusati, op. cit. (note 27), p. 5 (unpag.): "although Vermeer's picture is replete with emblematic accessories, they complicate rather than elucidate the unfolding narrative;" E. Snow, *A study of Vermeer*, Berkeley & London 1994, p. 164: "the more one looks the less one knows what she is doing;" Wheelock, op. cit. (note 2), p. 105: "Vermeer almost completely removed narrative from his paintings;" Gaskell and Jonker, op. cit. (note 2), p. 14: "While Vermeer could on occasion make extremely subtle use of the full panoply available to the pictorial allegorist,... in other works he progressively effaced the relative simplicity of iconographical allusion in favor of the pictorial ambiguity;" B.J. Wolfe, *Vermeer and the invention of seeing*, Chicago 2001, p. 157, sees a class edge to the privatizing effects of "the refusal of legibility so prominent in Vermeer." See also M. Hollander, *An entrance for the eyes*, Berkeley & London 2002, p. 98.

47 C. Hertel, *Vermeer: reception and interpretation*, Cambridge 1996, p. 181.

48 In *Woman reading a letter by an open window* (Dresden, Staatliche Kunstsammlungen, Gemäldegalerie) he eliminated a painting of Cupid holding up a single card, and in *Woman with a pearl necklace* (Berlin, Staatliche Museen Preussischer Kulturbesitz, Gemäldegalerie) he removed a map. Although a theoretical preference for floating meanings has fueled the tendency since the mid-twentieth century to interpret Vermeer's works as elusive, some of the artist's contemporaries would probably have recognized and welcomed the strategy of concealment and multivalence of meaning, as Eddy de Jongh has emphasized. See E. de Jongh, "On balance," in Gaskell and Jonker, op. cit. (note 2), pp. 351-65, esp. p. 357.

49 Brusati, op. cit. (note 1), p. 74.

Emphasizing the separateness of the projected image, Jonathan Crary succinctly generalized that the camera obscura sundered "the act of seeing from the physical body of the observer."[50] I have not found images by any other artists which reveal comparable awareness that the projected image can remain independent of the viewer's optical focus. Only Vermeer's works suggest that he lingered over what happens on the screen if the lens remains focused away from the ostensible main subject. As a result, two different prioritizing systems work in unobtrusive opposition in his paintings. According to the hierarchy of subject matter, the woman obviously figures as the key element, but if her degree of optical focusing is taken into account she becomes only peripheral. Conversely, a detailed section of back wall, if present, can alternatively serve as just background for the woman, or as the optical center of the scene. Which part functions as the center and which as the periphery remains in subtle flux, depending on whether the mental or mechanical mode of establishing a focus receives priority. A number of Vermeer's paintings thus warrant being described as a distinctly pictorial counterpoint to the new theoretical distinction between the mechanical stage of vision and its conceptual stage.[51] By contrast, other figural artists who worked in a naturalistic style kept their optical/iconographic focus as one unit. Conceivably Vermeer could have developed his unprecedented type of split focus from just his creative imagination, but a stimulus was built right into a camera obscura equipped with a lens.

Vermeer's displacement of the optical focus also shaped reception by making familiar domestic subjects look subtly unfamiliar. As a result, his images preclude easy closure of the viewing process. Their split focus, which remains more sensed than noticed, as does the consequent visual ambiguity, probably contributed to the sharply escalating interest in Vermeer's work since the late nineteenth century.[52] Though viewers may remain unaware of the degree to which his paintings incorporate fresh observations about the visual process itself, they respond to the works in kind, with longer, more absorbed and less talk-accompanied looking.[53]

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50 Crary, op. cit. (note 32), ch. 2, quotation on p. 39. Although Crary's main topic is vision in the nineteenth century, his book includes a substantial section on the early camera obscura, especially the room or tent type of model.

51 Comparable ideas have occasionally surfaced at roughly the same time throughout history, but independently, from individuals who may work in different professional fields. For an essay about such parallelisms see O. Benesch, "Related trends in arts and sciences in the late Renaissance," in idem, *The art of the Renaissance in northern Europe*, London 1965, ch. 8.

52 To the several reasons others have suggested for the enthusiastic reception of Vermeer's work in the last third of the nineteenth century I would add that his unusual handling of optical data had fresh relevance at that time. J. Crary, *Suspension of perception: attention, spectacle, and modern culture*, Cambridge (Mass.) & London 2001, p. 40, has argued that "attention," or rather, the ongoing shift between attention and distraction, grew into a compelling area of inquiry on various research fronts during the second half of the nineteenth century. "A normative observer in the nineteenth century began to be conceptualized not only in terms of the isolated objects of attention, but equally in terms of what is not perceived, or only dimly perceived, of the distractions, the fringes and peripheries that are excluded or shut out of a perceptual field.... Part of this new disjunct model of vision was linked to the physiological discovery of the nonhomogeneous nature of the eye itself, with its small area of foveal clarity within a much larger field of peripheral indistinctness. However, it was the metaphorical and not the empirical impact of this model that became important for modern configurations of the observer." Vermeer's works had special relevance in this cultural climate. Though no commentator pointed it out explicitly, some viewers must have experienced the subtle tension that results from trying to see the woman as clearly as a section of her setting. The unprecedented disjunction between an optical and a conceptual focus constitutes part of the appeal of Vermeer's work in modern times.

53 This behavior was exemplified by the people who braved bitter cold in the long lines that wound around the National Gallery, Washington, in 1996 to attend the Vermeer exhibition. Neither the crowding nor the high expectations created by publicity can account for the quiet that prevailed or for the prolonged looking rather than the darting glances typical of museum visits nowadays.