muscle, and bone that constitute her body. The question of where identity resides is disturbingly laid bare by this horrific disconnection of flesh (that layer of Orlan’s self that reads as her face) and body. The self, like the other, becomes a projection, concealed only through ideology; femininity’s “lack” propels itself onto the masculine.

In the 1990s the Nietzschean conception of femininity as artifice implodes through its very exaggeration. As feminist performance works such as Orlan’s suggest (extending de Beauvoir’s now fifty-year-old insight), a “woman” is something we become through cultural inscription, a constant exercise in sustaining (or performing) the fiction of “femininity.” This fiction can be articulated so as to stabilize the conventional structures of gender difference or, as in the work of Pane, Wolverton, Piper, Gomez, or Sprinkle, to glory in their perversion.

[See also Feminism.]

BIBLIOGRAPHY


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PERSPECTIVE. [To explore the history, development, and current status of the notion of perspective, this entry comprises two essays:]

An Overview

Psychology of Perspective

The first essay is a historical and conceptual overview of (linear) perspective within art history, which is also the notion of perspective that has been most prominent in aesthetics. The second essay discusses contemporary theories of perspective and pictorial representation in cognitive science and shows their relevance to art history and aesthetics.

An Overview

Perspective refers generally to the devices used by painters to represent space on plane surfaces. Perspectival devices include the use of gradients of hue, brightness, or texture to simulate the optical distortions involved in the perception of objects from a distance; such devices are known as “atmospheric” perspective. But more interesting to philosophers, traditionally, are the geometric procedures used by painters to project lines, planes, and solid bodies on to plane surfaces. One system in particular, known as “linear,” “central,” or “one-point” perspective, has proved highly effective and indeed has dominated Western painting since the Renaissance. Linear perspective measures the regular diminishment in apparent size of objects as their distance from a stationary beholder increases. The method was first propounded and applied by fifteenth-century Italian artists. The mathematics of perspectival projection was established in the seventeenth century by Gérard Desargues and other French geometers.

The ordinary linear perspective used by painters is nearly correct within certain limits, for instance, for representations of a sufficiently narrow field of vision (smaller than about thirty-seven degrees across). More thorough transformations require the more complete theorems of projective geometry. But even correct perspective does not reproduce the results of actual perception. Perspective fails to take into account the effects of binocularity, the anatomically governed distortions and unclarity at the margins of
the visual field, and the movement of the eyes and head. Only under very special conditions will the beholder of a perspectival projection actually be deceived. And since the main purpose of Western oil painting has been to represent fictional spaces rather than to create actual illusions of space, the strict correctness of the perspectival projection has not always been a major concern, even for Renaissance and post-Renaissance Western painters. Only at isolated moments has perspectival correctness been considered indispensable to the effectiveness or value of a painting. In fact, inaccurate or incomplete methods of projection are often used deliberately to produce desired pictorial effects or to display spatial information more clearly: for example, when architectural drawings use so-called isometric or non-convergent perspective, whereby straight lines in a given dimension are all drawn to the same scale and orthogonal lines are set a fixed angle.

The earliest written account of perspectival projection is found in the treatise *De pictura* (1435) of Leon Battista Alberti, a Florentine humanist and architect. Alberti defined a painting as “the intersection of a visual pyramid at a given distance, with a fixed center and certain position of lights, represented by art with lines and colors on a given surface.” This conception of the painting as the transcription of an imaginary “picture plane” suspended between the beholder and the viewed scene was revolutionary. It linked the art of painting to the sciences, in particular to medieval optics and to Euclidean geometry. Alberti then explained how to draw a tiled floor on a plane surface so that it would appear to recede into the distance at a fixed rate. The floor would serve as a measured grid on which bodies, including human figures, could be placed in their proper scale and spatial relation to one another. Italian painters had been placing figures on squared floors for more than a century, often with considerable accuracy. But they seem to have used trial and error and workshop tricks rather than a theoretically grounded procedure. Alberti first explains the “picture plane” by comparing it to a window intercepting the bundle of light rays emanating from the world and converging on the eye of a stationary viewer (the “viewing point”). Then he explains how to construct the grid of the tiled floor as it appears foreshortened on the picture plane. The grid is plotted along both axes, first by connecting the points along the front of the original grid with the viewing point, and then by connecting the points along the side of the grid, seen in elevation, with the viewing point. This became known as the “plan and elevation” method or *costruzione legittima*. In the resulting projection, any lines perpendicular to the picture plane (the “orthogonals”) will converge on a single point (the “centric point,” later known as the “vanishing point”). The horizontal running through the vanishing point came to be called the “horizon.”

Much of the rest of Alberti’s treatise on painting explained how to construct pictorial narratives in virtual spaces, often on small panels and without illusionistic intent. Accurate diminishment of forms within these virtual spaces would contribute to the clarity of the pictorial narrative, which was especially crucial if mythological or historical subject matter was to compete with the familiar Christian narratives. Italian painting had been intensely occupied with the representation of boxlike interiors ever since Giotto, and this interest contributed to the development of Alberti’s method.

An interest in surveying techniques and in representations of exterior views of buildings or cityscapes, meanwhile, may have led to the mysterious perspectival experiment conducted by the Florentine sculptor and architect Filippo Brunelleschi around 1415–1420. According to his biographer, Brunelleschi prepared two panels representing public buildings in Florence in correct perspective and meant to be held up in the field of vision while standing on the appropriate spots in the city. If used properly, the panels were supposed to replace reality with convincing illusions. The account does not reveal how Brunelleschi constructed his images, but he may well have been using the very method later explained by his friend Alberti.

One of the uses for linear perspective in Renaissance and post-Renaissance painting was the representation, usually directly on walls, of plausible continuations of architectural space. The *Trinity* (c.1426) by the Florentine painter Masaccio, for example, shows a hypothetical vaulted chapel extending beyond the wall it is painted on, in real dimensions. Later examples include the ceiling of the Camera degli Sposi in Mantua by Andrea Mantegna (1465–1474), with an oculus opening onto the sky and ringed by peering figures; the walls of the Sala delle Prospettive in the Palazzo Farnesina by Baldassare Peruzzi (1516–1517), which open onto painted views of Rome; or the many Baroque ceilings painted dal di sotto in su, most famously the dome and nave of Sant’ Ignazio in Rome by Andrea dal Pozzo (1688–1694). Such entertaining visual tricks often depend on the beholder occupying a fixed standpoint. It should be noted that those frescoes, panels, or canvases painted in perspective that do not strive for trompe l’œil effects, that is, to say, the great majority of perspectival pictures, do not require the beholder to stand in a particular spot in order for the perspective to look correct.

The other main perspectival construction devised in the Renaissance was the so-called distance point or third point method. This simpler procedure relies on the fact that the two vanishing points of lines making forty-five-degree angles with the picture plane stand at a distance from the center of the horizon equal to the distance from the viewing point to the center of the horizon. The painter chooses a point on the horizon line at the desired distance, and then determines the diagonals of the squares on the checkerboard by drawing lines that converge on that point. Like the plan and elevation method, this procedure provides the
measurements of the squares in the floor grid and permits the painter to place objects and figures on the floor in true scale. The distance point method was first expounded in print by the French amateur Jean Pèlerin (known as Viator) in his treatise _De artificiali perspectiva_ (1505). A similar procedure had been demonstrated by the Paduan humanist Pomponius Gauricus in his _De sculpture_ (1504). Distance point methods clearly derived from workshop traditions dating back to the time of Giotto. Their exponents generally did not share Alberti’s interest in optics or in such abstract notions as the picture plane.

The next important theorist of perspective after Alberti was the painter Piero della Francesca. Piero, a student of mathematics, refined and improved on Alberti’s method in his treatise _De prospectiva pingendi_ (c.1474), and addressed in detail the problem of the proportional diminution of forms as they receded in space. The German artist Albrecht Dürer seems to have been especially affected by Piero’s ideas. In the pages on perspective in his mathematical treatise _Ueberwysung der Messung_ (1525), Dürer demonstrated the full plan and elevation method. He also offered a more practical shortcut (“the shorter way”) that combined _costruzione legittima_ with the distance point method.

Leonardo da Vinci left hundreds of remarks on perspective in his notebooks. Leonardo notably worried about perspective’s failure to account for the perceived curvature of straight lines at the margins of the visual field. He argued that differences in apparent size of objects ought to be governed by the angles subtended by the objects at the viewing point, and not by the lengths of their intersections of the picture plane, as in standard linear perspective. Certainly, the discrepancy between the two ways of calculating the ratios increases as the viewing angle increases, that is, at the edges of the picture. In general, Leonardo was interested in the limits of perspective’s power and in all the other factors besides perspective that contribute to depth perception. Apparently to compensate for the flaws in the standard system, Leonardo made a number of adjustments to the perspective of his _Last Supper_ fresco, resulting in an unintelligible fictive space.

The problem of wide-angle vision did become a major theme in the critique of linear perspective throughout its history. Some perspectivists offered systems for mapping curved lines onto the picture plane. There are two main reasons why curvilinear perspective did not supplant linear perspective as the standard method. First, it is not clear that we ever do perceive straight lines as curved. Second, if we do, then the extreme edges of pictures done in ordinary linear perspective will themselves appear distorted and therefore correct.

It has been argued that the discovery of perspective by Brunelleschi and Alberti, together with the writings of Piero, Leonardo, and Dürer, represented a singular moment when the fine arts made an actual contribution to the history of science. In the sixteenth and seventeenth centuries many more artists and amateurs wrote treatises on perspective. Some of the most important were Jean Cousin’s _Livre de perspective_ (1560), Daniele Barbaro’s _La pratica della perspettiva_ (1569), and Giacomo da Vignola’s _Le due regole_ (1583). But the theorems of projective geometry established in the seventeenth century did not directly derive from the earlier researches and writings of the painters. Before 1600, in fact, there was no theory or proof of the vanishing point at all. Nor did the extravagant perspectival illusions of the Baroque ceiling painters draw on the recent findings of the mathematical perspectivists.

Perspective became a basic feature of the academic training of painters. The pioneering Florentine and Roman academies of painting, founded in 1563 and 1593, offered instruction in mathematics. Representational painters ever since have recognized that the basic principles of linear perspective with more or less enthusiasm. Few modern artists have devoted much attention to the deeper puzzles of perspective. The British painter J. M. W. Turner did teach perspective at the Royal Academy, but somewhat unsystematically. The American Thomas Eakins was perhaps the last major painter to make a serious study of perspective.

Western painting, it is fair to say, has only intermittently insisted on correct linear perspective. Even a perspective maven like Dürer rarely bothered to apply the method consistently in his paintings and prints. Painters typically adjusted the correct perspective in order to avoid undesired visual effects. And the painters who did construct precise perspectives were often pursuing a personal inclination or an aesthetic ideal rather than a pedagogical or epistemological imperative. Giorgio Vasari, the first historian of Italian art, observed disapprovingly that the painter Paolo Uccello took an excessive delight in the method of linear perspective. Uccello ornamented his narrative pictures, for example, with dead bodies and broken lances lying neatly along orthogonal lines, producing highly implausible pictorial fictions. Perspective for some, in other words, became an end in itself.

Perspective made it possible to construct virtuoso illusions with bits of inlaid wood (a technique known as marquetry or intarsia); to depict complex polygonal objects from any point of view; to construct fantastic but vividly detailed architectures and cityscapes; to show human bodies sharply foreshortened from unfamiliar angles. Part of the appeal of perspective in the Renaissance, evidently, was the sheer delight taken in the formal tension between the objective pattern on the two-dimensional plane and the virtual space generated by reading the pattern as a projection. Perspective also made possible the ingenious device of anamorphosis, whereby an object is depicted from an unnaturally oblique point of view. When the picture itself is then observed from an angle, the two foreshortenings cancel each other out and the object looks normal.
Perspective proved a powerful rhetorical device in the hands of major painters. A vanishing point met by a bundle of unobstructed orthogonals can serve as an emblem of infinity. An eccentric vanishing point, as in some compositions by Tintoretto, can give an effect of drama and violent movement. The precisely constructed paintings of the theorist Piero della Francesca, by contrast, exude rationality, mastery, and cool detachment; this inevitably affects the response to the subject matter, whatever it might be. Some seventeenth-century Dutch painters (e.g., Pieter Saenredam) became famous for perspectival views of luminous church interiors; it is arguable that these complex and precise constructions themselves constituted the true subject matters of the pictures.

Early twentieth-century painters decisively repudiated the supposed ambition of earlier Western painting to reproduce optical experience. Ever since, linear perspective has been the principal emblem of that abandoned ambition. In twentieth-century thought, painterly perspective, with its hypothesis of a fixed and stationary beholder, its respect for the evidence of the senses, and its endorsement of a subjective point of view with objective validity, has in turn been repeatedly enlisted as an emblem for Western empiricism, rationalism, individualism, anthropocentrism, or relativism. A central contention—found in Martin Heidegger’s “Age of the World Picture,” for example—is that the picture constructed according to a fixed point of view is the historical correlate and complement of subjectivity itself. For Heidegger, “what belongs properly to the essence of the picture is standing-together, system” (Heidegger, 1977, p. 141); and the constitution of the world as a picture “is one and the same event with the event of man’s becoming subjectum in the midst of that which is” (p. 132). Perspective has long been used by modern philosophers as a metaphor for the conditions of knowledge, for example, by Gottfried Wilhelm Leibniz and Friedrich Nietzsche. The overall persuasiveness of such metaphors, however, does not seem to depend on more specific observations about the invention of linear perspective or its application in painting.

The first detailed challenge to the unique epistemological legitimacy of Western perspective was the art historian Erwin Panofsky’s “Perspective as ‘Symbolic Form’” (1927). Panofsky believed that curvilinear perspective produced a more accurate representation of our optical impressions. He therefore reasoned that the overwhelming success of the less accurate method, Alberti’s linear perspective, must reflect the peculiar demands and conditions of Renaissance and post-Renaissance European culture. Panofsky saw each perspectival system as an expression or “symbolic form” (a concept borrowed from the philosopher Ernst Cassirer) of the culture that devised it. According to Panofsky, linear perspective’s achievement was to have efficiently negotiated between the objecthood of the viewed scene and the subjecthood of the beholder. But the model for this epistemological reconciliation was the Kantian “category,” the cognitive framework that makes possible the mind’s very apprehension of the world. Panofsky did not dismiss Immanuel Kant’s epistemology as a mere “symbolic form” of European culture, but rather accepted it as a fundamental philosophical truth. Therefore, Panofsky’s assessment of perspective is contradictory and his relativism limited.

Panofsky’s thesis that perspective is a mere convention of the post-Renaissance West, however, was adopted and radicalized by later writers. Rudolf Arnheim in Art and Visual Perception (1954) argued that the “funnel” produced by the convergence of the orthogonals on the vanishing point in many Renaissance paintings is a “violent imposition” and a distortion “not caused by forces inherent in the represented world itself” (Arnheim, 1974, p. 294). Such paintings are thus “manifestations” of Renaissance individualism and of a “hierarchical conception of human existence.” The classic philosophical statement of the relativist position is found in Nelson Goodman’s Languages of Art (1976). Goodman argued that “the behavior of light sanctions neither our usual nor any other way of rendering space” (p. 19). He pointed out that in linear perspective lines parallel to the picture plane—for example, the vertical edges of a tall building—remain parallel, although in reality such lines will appear to converge. In general, he maintained that “no degree of resemblance is sufficient” to establish a relationship of reference between picture and an object (p. 5). For Goodman, then, linear perspective is a conventional procedure that needs to be learned to be understood. The phenomenologist Maurice Merleau-Ponty also repudiated perspective as a mode of seeing overlaid on top of perception by culture. Merleau-Ponty said that “Renaissance perspective is a cultural fact, that perception itself is polymorphous, and that if perception has become Euclidean, it is because it has let itself be oriented by the system.” The idea of the conventionality of perspective has become a commonplace in much recent Continental and Anglo-American thought and has played a major role in the critical assault on painting as an art form, in the field of film theory, in ideology-critique, and in feminist and psychoanalytic theories of the image and the gaze.

Many other writers on perspective have tried to refute or modulate this extreme conventionalism. Ernst Gombrich in Art and Illusion, for example, used the findings of perceptual psychologists to show that linear perspective produces effective illusions of the appearance of the world. This basic confidence in the uniquely successful and indeed objective nature of perspectival projection is shared by Decio Giorgi, Samuel Edgerton, Jr., and Michael Kuchov, among others. Western pictorial perspective is presented by these writers as a limited but legitimate application of geometric principles that enjoy universal validity.

A major intervention in the debate on perspective is Hubert Damisch’s recent Origin of Perspective. For Damisch,
linear perspective is the fundamental scene of Western painting’s philosophical ambitions, namely, to participate, alongside other sign systems, in the constitution of subjectivity. Perspectival painting, by positing a grammatical subject, a second person, and even a third person (in the “distance point”), reproduces the basic conditions of intersubjectivity. Following Jacques Lacan, Damisch argues that perspective stages the originary “capture” of the subject in the gaze. Thus, perspective for Damisch is neither a mere simulation of our optical impressions of the world, nor a mere cultural imposition, but a model or machine that reveals the structure of the mind to itself, independent of the particular historical circumstances of its discovery or use.

[See also Alberti; Gombrich; Goodman; Panofsky; and Renaissance Italian Aesthetics.]

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Christopher S. Wood

Psychology of Perspective

A painter who wishes to represent a scene must convey at least two of its aspects: (1) its layout, including information about the viewer’s implied station point, and (2) the solid shape of the objects in the scene. The artist may also choose to represent four additional aspects of the scene: (3) the illumination of the scene, including information about the number of sources, their location, their intensity, and their color; (4) the medium’s tendency to absorb and diffuse light; (5) object color; and (6) surface texture (e.g., is it fur, or is it skin?), including information about temporary features such as wetness.

These types of information are not independent. Consider the following three examples:

Since the atmosphere absorbs red light more than blue light (aspect 4), the artist may paint distant objects bluer than close ones, and thus provide the viewer with layout information (aspect 1).

If the scene is illuminated by the sun (aspect 3)—a strong light source at infinity—the artist may use shadows to provide the viewer with information about layout (aspect 1).

If the scene is illuminated by a weak source, such as a candle (aspect 3), the artist may use chiaroscuro to convey the solid shapes of the illuminated objects (aspect 2).

It may appear that there is a single procedure that suffices to convey the layout of a scene (aspect 1): construct the picture in accordance with the laws of perspective. For the historian, the existence of a single solution to the depiction of layout is plausible because perspective was invented at a known time (c.1411), at a known place (Florence), by a known person (Filippo Brunelleschi). For the mathematician, it is also plausible, inasmuch as perspective consists of a coherent collection of rules implied by the axioms of projective geometry.

Cognitive scientists, on the other hand, do not treat perspective as a single device that conveys the layout of a scene. They think of pictorial representation as a collection of tricks, each of which triggers the response of one or more specialized modules in the visual system. As a result, perspective is neither a necessary nor a sufficient condition for felicitous representation.

First, we will see that the use of perspective is not a sufficient condition for the adequacy of a depiction. For instance, whenever three lines in a picture intersect to form an arrow juncture or a fork juncture (Figure 1) we tend to see them as a rectangular trihedron, that is, three orthogonal planes meeting at a point, like the corner of a cube. We see them this way, however, only insofar as they satisfy D. N. Perkins’s laws (Perkins, 1968, 1972), summarized in Figure 1: the measure of each of the three angles of a fork juncture may not be less than ninety degrees; the measure of each of the two angles of an arrow juncture may not exceed ninety degrees; their sum must exceed ninety degrees. These are not laws of perspective, and can be violated by drawings in perspective.

When a picture violates Perkins’s laws, the objects in the scene seem distorted. Consider an engraving by Jan Vredeman de Vries (1604–1605; see Perkins, 1968), illustrating his 1599 treatise on perspective (Figure 2). Even though this picture adheres to the rules of central projection, it looks distorted. We have no reason to think that Figure 2 is a rep-