
Reviews

National Gallery videotape provides fine introduction to perspective

by Bonnie James

Masters of Illusion

Produced and directed by Rick Harper
National Gallery of Art, Washington, 1991
30-minute videocassette.

This 30-minute film issued by the National Gallery of Art as part of the special exhibit "Circa 1492: Art in the Age of Exploration," is a fine introduction to the science of visual perspective and the art of the Italian Renaissance. Using methods which have great appeal to adults and children, it demonstrates how the works of art are "constructed" to achieve the "illusion" of reality. Although the exhibit has now closed, the videotape (produced with funding from Canon U.S.A. and Canon, Inc.) can be purchased at the museum shop for about \$30, and will allow many to continue to enjoy some of the wonderful works of art and ideas that the exhibit illuminated for those fortunate to see it last fall.

Surprisingly, the most delighted responses I observed were those of two boys, one 8 and another 13 years old, in two separate viewings. The older boy, usually very blasé about anything remotely connected with "culture," found the film an enjoyable way to learn about art—which he refuses to be "lectured to" about. The younger boy's rapt attention to the film was punctuated by numerous exclamations of "oh boy!" and similar outbursts of enthusiasm.

Vision and illusion

The film—amiably and expertly narrated by James Burke, described in a press release as "Great Britain's foremost commentator on science and technology"—begins by showing some of the "special effects" used in a Hollywood fantasy film (these really get the kids' attention). Burke opens

by saying, "This is a film about vision and illusion," explaining how special effects "fool the eye" using basic techniques employed *500 years ago* by the Masters of the Renaissance who faced the same challenge as today's special effects artists; that is, how to make a flat picture appear three-dimensional and believable—whether the surface be a movie screen or church wall or a canvas. Burke's narrative joins the technologies of computer modeling and special effects used in filmmaking, with the greatest works of Renaissance art, to convincingly demonstrate the "new science of perspective" developed by the "Masters of Illusion" as the artist-scientists of the Renaissance are designated.

Despite the magical-sounding title, this short film modestly challenges several centuries of coverup of the interconnectedness of beauty, art, and science imposed by the so-called Enlightenment, and effectively buries the carefully constructed hoax of "art for art's sake."

Burke announces that the film will examine the period between 1400 and 1550, described as the age when Copernicus, who first hypothesized a heliocentric solar system, and Columbus, whose voyages of discovery were a project of the Renaissance, were changing our understanding of the world, as Renaissance artists were changing how we see that world. "It was," he says, "a period of great artists, great discoveries, and great illusions."

The Renaissance began in Italy

As Burke informs us that the Renaissance begins in Italy, we are treated to a stunning vista of Florence, with the dome of the Cathedral of Santa Maria del Fiore towering over the city, a city filled with great works of art and architecture. The film footage of these works evokes the excitement of coming upon them *in situ*. Grand as this is for the first-time viewer, it is even more revealing for one who is familiar with standard still shots of these works from books and slides,

almost always seen “head-on” even if in reality they would not have been seen that way. The video camera recreates the process of reaching the “standard view” (and in most cases, the artist did intend an ideal position) as one of discovery. We see briefly some of those works of art: Botticelli’s *Adoration of the Magi*, Ghiberti’s “Gates of Paradise” on the Baptistery. Burke reports that the dome of the beautiful Florence cathedral was designed by one of the principal innovators in visual perspective, Filippo Brunelleschi (1377-1446). A statue of Brunelleschi is shown, where he is seen designing a building with a compass.

In 1413, some seven years before he began work on the great dome of the cathedral, Brunelleschi carried out an experiment which demonstrated the principle of linear perspective—the idea that parallel lines appear to converge at a “vanishing point” in the distance (the “railroad track” principle). Although this seems today like a very simple idea, it took centuries to develop a rigorous system to illustrate it.

Next we see a painting by Giotto (1266-1337), known as the Father of the Renaissance, whose life is almost exactly contemporary with the life of another illustrious Florentine, Dante Alighieri. Giotto’s fresco, a detail from the *Legend of St. Francis* from the Upper Church in Assisi, was painted in the last decade of the 13th century, and demonstrates how earlier painters relied on powers of observation to create depth; although parallel lines seem to recede in the distance, there is no scientific system to unify the illusion. Here, computer graphics are effectively employed to show how Giotto’s painting might have been composed employing the new technology invented by Brunelleschi more than a century later.

Masaccio’s ‘Trinity’

The first painter to employ Brunelleschi’s science of perspective was the Florentine, Masaccio (1401-1428), who painted the extraordinary *Trinity* on the church wall of Santa Maria Novella in 1427. Burke reveals the *Trinity* to be the first known painting to demonstrate true linear perspective. Masaccio’s fresco creates the illusion that the wall has been “broken through” to add a new room. The perspective lines converge downward from Christ’s outstretched arms to a vanishing point at the base of the cross at the viewer’s eye-level so that he gazes up at the crucified Christ. The composition of intersecting upright and downward-pointing triangles, enclosed within a curved arch, suggests nested Platonic solids; thus, the mystery of the Trinity becomes transparent to man’s divinely inspired reason, expressed through geometry. Pictured below the crucifixion is another *trompe d’oeil*—an open sepulchre seemingly carved into the church wall, with a human skeleton exposed within. Below the corpse are written the words, *Io fu già quel che voi siete e quel ch’io son voi anco sarete* (“I was once what you are, and that which I am, you also will be”), so reminding us of both our divine gift of reason, and our human mortality.

Burke notes that the science of perspective begins to show up around the same time in works of sculpture as well, such as Lorenzo Ghiberti’s magnificent bronze reliefs of Old Testament scenes, known as the “Gates of Paradise” of the Florentine Baptistery.

Even playful uses—including political satire, as we shall see later—of perspective are represented here. We next see a magnificent chamber of inlaid wood (*intarsia*) in the ducal palace at Urbino, arranged in such a way as to create the illusion of a deep landscape outside a window in a room filled with musical instruments, geometric objects, books, and so forth. The illusion, however, falls apart as the camera moves to a different “perspective” or viewing point.

Linear perspective reaches a high point of development in the work of another Florentine painter and mathematician, Piero della Francesca (1420-1492), whose studies of projective geometry are made intelligible by the film’s use of computer graphics. In Piero’s great work, the *Flagellation of Christ* painted for the ducal court at Urbino ca. 1450, the precise meaning of which is still being debated after some 500 years, there are two distinct scenes: one in the background, of Herod ordering the flagellation of a serenely calm Christ, while three oddly matched men stand in the foreground, seemingly unmoved by the drama being played out behind them. They are unified only by one coherent perspective, constructed according to precise mathematical rules, and by a bright, even light which unifies all the figures.

Paolo Uccello (1397-1475) who, according to Vasari, the famous biographer of the greatest Renaissance artists, was often heard to exclaim, “Oh, what a sweet mistress is this Perspective!” constructed in two dimensions an uncannily accurate portrayal of a chalice—a *tour de force* of positive and negative curvature—in such a way that one is tempted to imagine that he must have used a computer!

Burke also shows us a woodcut of St. Jerome by the German artist Albrecht Dürer (1471-1528), who traveled to Italy to learn the new science of perspective, probably from Leonardo himself. Here Dürer uses multiple vanishing-point perspective to create a complex reality within which the saint is surrounded in his study by the objects of a life of science and learning, his faithful lion as companion and protector.

Leonardo and the science of vision

Leonardo da Vinci (1452-1519), described as “scientist, inventor, musician, architect and painter,” is said to have reexamined every aspect of his world. In his voluminous notebooks, many of which are preserved, we find his observations and studies revealing his utter fascination with sight. Burke informs us that Leonardo’s goal was the understanding of the physiology of sight itself. Leonardo rejected the notion that light rays emanate from the eye—instead he argued that light enters the eye. Of course, he was right.

Leonardo’s treatment of light and shadow are illustrated using computer graphics to show how light falls on a sphere



"St. James Led to Martyrdom," by Andrea Mantegna shows a brilliant use of an unusual perspective angle. Mantegna forces the viewer to identify with the jailor's humility as he looks up at the saint and begs him for forgiveness (Padua, Eremitani Church; destroyed).

and creates shadows on the object itself, as well as casting shadows, and how the shadows "model" the object. Leonardo called this *sfumato*; in his notes on painting, Leonardo says that light and shade should blend "without lines or borders, in the manner of smoke." Burke notes that Leonardo's treatment of the area between light and shade becomes the means to create an even more convincing illusion of reflected light and illusion of depth.

The Renaissance Masters then applied these techniques to a more complex form: the human face. The figure drawings of Michelangelo and Raphael for the frescoes in the Sistine Chapel are shown here.

The Masters achieved even greater heights of illusion when using these principles in their paintings. Next we see Raphael's *Transfiguration*, which uses bold lighting effects—like those in a theater—to dramatize the action. Raphael Sanzio (1483-1520) uses multiple perspective in this extraordinary work, where there are two simultaneous "eye levels," which place the "audience" in each of the two levels of the painting; each scene is composed in a "curved" space, the upper space where two prophets "rotate" around the cen-

tral figure of Christ, and the lower space where the gestures and facial expressions of the witnesses of His transfiguration convey to us the miraculous nature of the moment. The two realities are unified by the light, which reinforces the drama of the event.

Leonardo's *Mona Lisa* is perhaps the most effective illustration of the use of light and shade modeling in the human face where softened shadows (*sfumato*) are masterfully employed to shape the positive and negative curvature of the form.

Atmospheric perspective

Burke now turns to Leonardo's unique contribution to the science of perspective.

Observations from nature led Leonardo to observe in his notebooks, "The air which is interposed between the eye and the seen object, obscures the object to some extent, and if the interposed air is of considerable quantity, then the seen object will be strongly tinted with the color of the air." Leonardo called this phenomenon "atmospheric perspective," or the "perspective of disappearance."

In his *Madonna of the Rocks*, Leonardo uses foreground colors that are warm, or red to yellow tones, which “advance” while the background becomes cooler, and has less contrast as it recedes. In the far background, blue mountains virtually “disappear into an evanescent, smoky haze.”

Playful uses of the art of illusion are found in “anamorphic” perspective, literally, producing unequal magnifications along two axes perpendicular to each other; Leonardo drew the first known anamorphic or stretched image in the 1490s, however a German artist, Erhart Schoen, used anamorphic art to disguise double meanings within the images of a picture puzzle. He mixes portraits with scenes from an historical battle. The portraits lampoon certain royal personages while contrasting them with the serious nature of war, thus giving a new twist to an art as old as government itself—political satire.

Dramatic perspective

With the work of the Mantuan painter, Andrea Mantegna (1431-1506), a new form of perspective is born; using unexpected viewpoints, or what might be termed “dramatic” perspective, Mantegna shifts the “camera angle” or point of view (eye level) to establish his conception. In his *St. James Led to Martyrdom*, a fresco painting in the Eremitani Church, tragically destroyed in World War II, we find a brilliant use of this method. The young jailer in the foreground begging St. James’s forgiveness provides the motivation for the unusual angle; he forces himself to look up at the saint, the man whom he has kept imprisoned; Mantegna forces us to identify with the jailor’s humility by placing us at ground level with the jailor.

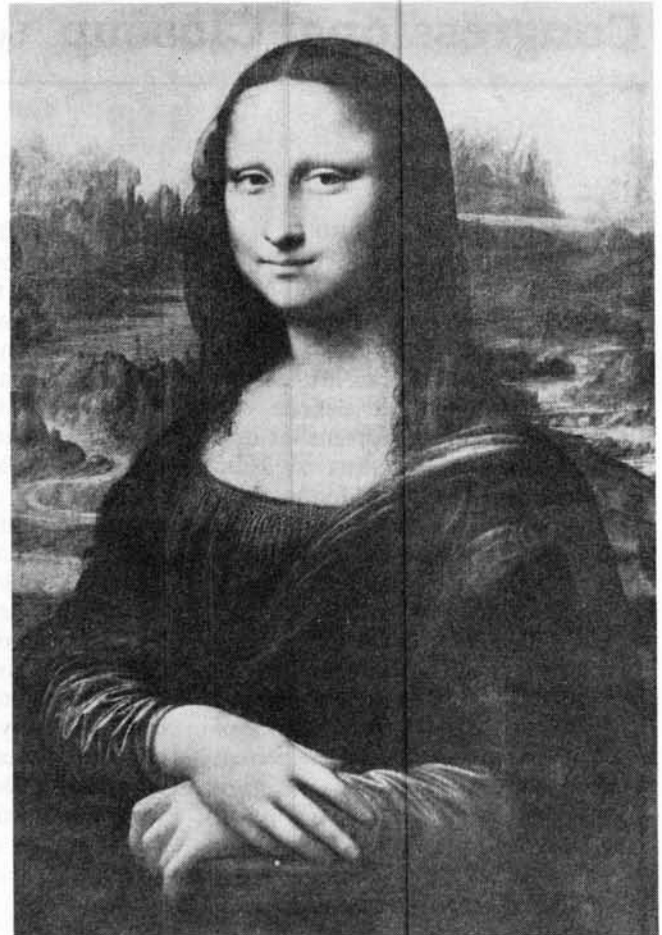
In a later painting, Mantegna places us at the feet of another subject; but his time with even more powerful effect. We are now at the feet of the dead Christ, dramatically and painfully confronted by Christ’s wounds. The point of view is stark and severe. Mantegna pushes the spectator closer than he wants to be, close enough to feel the coldness of death.

But Mantegna can be playful too. In the ducal palace in Mantua, Mantegna is commissioned to paint a small ceiling and uses the opportunity to create another striking viewpoint. Characters look down on us from an imaginary circular opening in the ceiling high above; they seem to be enjoying the view. They become the spectators, while we are now observed.

During the period known as the High Renaissance, the Masters begin to use techniques of perspective on a monumental scale, exploding the boundaries of architecture. In the Sistine Chapel of the Vatican, reports Burke, Michelangelo creates figures larger than life who break through the boundaries of the ceiling into the heavens above.

School of Athens

With Raphael, we reach the pinnacle of the High Renaissance. In another part of the Vatican, we find the monumental



The portrait called “Mona Lisa,” (Paris, Louvre) by Leonardo da Vinci, painted after 1500, is one of the most masterful examples of the use of “sfumato,” a technique of blending light and shade “in the manner of smoke” to create an even more convincing illusion of reflected light and depth.

works of the Stanza della Segnatura, crowned by the *School of Athens*, described by Burke as a chronicle of Raphael’s time. Here we find portraits of Leonardo, as Plato, symbolizing the birth of western civilization; of the sculptor Michelangelo as the pre-Socratic philosopher Heraclitus, looking somewhat “blocked” as he leans on a large cubic object in the foreground; and back in the far right-hand corner, looking innocently and confidently out at the viewer, is Raphael himself. Also present, in the guise of Archimedes teaching a geometry class, is Bramante, architect and teacher of Raphael in Rome, whose design for the new Basilica of St. Peter’s is the model for the monumental architecture in the *School of Athens*. (The character “acted” by Bramante, although certainly Archimedes, is often misidentified as Euclid.)

Through this painting, suggests Burke, Raphael ensured that the Masters of the Renaissance and their visual achievements would not soon be forgotten. In fact, he concludes, they were to set the foundations of the visual arts for centuries to come.