

## VIRTUAL EDUCATIONAL SPACES

There are many uses of virtual spaces for informational purposes. Some art museums, for example, provide simulated gallery spaces that the viewer can move through. An actual three-dimensional artifact in the museum may be made into a virtual object that allows a viewer to rotate it and see it in the round and from various distances, from close to far, without being in the museum. The Metropolitan Museum of Art in New York City, for example, provides an online virtual tour of its popular American period rooms (5.17), which offers an opportunity to see how Americans of earlier centuries furnished and decorated their domestic interiors. The virtual rooms are designed to succinctly show stylistic choices of different places and times with accurately reproduced furniture, accessories, paint, wallpaper, and fabric.

## Illusional Space

Artists have been creating illusional space for thousands of years in many different cultures. The fifteenth-century book illustration *Yusuf Pursued by Potiphar's Wife Zulaykha*, by Persian artist Kamal Al-Din Bihzad (5.18), uses conventions of Persian manuscript painting to render a story told in the Qur'an. The narrative Bihzad depicts is also recounted in a mystical Persian poem, and the artist has written four lines of the poem into his representation of the palace. It is a story of failed seduction: resisting the amorous and adulterous advances of Zulaykha, Yusuf tears himself away from her grasp. The artist painted an elaborate architectural setting, with staircases leading to different levels. A Persian scholar writes about the effective use of space in the painting: "Bihzad's setting, with its receding, empty spaces, firmly shut doors, sharply angled walls, and zigzagging stairs, provides a brilliant visual embodiment of Yusuf's conflict."<sup>7</sup>

### INDICATORS OF ILLUSIONAL SPACE

You can create the illusion of three-dimensional space on a two-dimensional plane with some basic indicators. They are foreground, middle ground, and background; and size, overlap, transparency, and placement, often used in combination.



5.18 KAMAL AL-DIN BIHZAD *Yusuf Pursued by Potiphar's Wife Zulaykha*, 1488. Watercolor, ink, and gold on paper, 12 × 8 in.

**Foreground, Middle Ground, and Background.** In two-dimensional representational artifacts, **foreground** is what appears closest to us. **Background** is what appears farthest from us, and **middle ground** is the space between foreground and background.

An unknown Indian artist working several hundred years ago painted an amorous encounter between Krishna, the Hindu god of love, and his beloved Radha (5.19). The narrative is based on Hindu tradition, and the scene is represented with Hindu conventions for depicting reality. To achieve the illusion of space, the artist depicted the trees larger in the foreground and smaller in the background, and placed the loving couple in the



5.19 UNKNOWN ARTIST *Krishna and Radha in a Bower*, c. 1775–1780. Watercolor and gold on paper, 6 × 10 in.



5.20 PIETER BRUEGEL *The Tower of Babel*, 1563. Oil on oakwood, 114 × 155 cm.

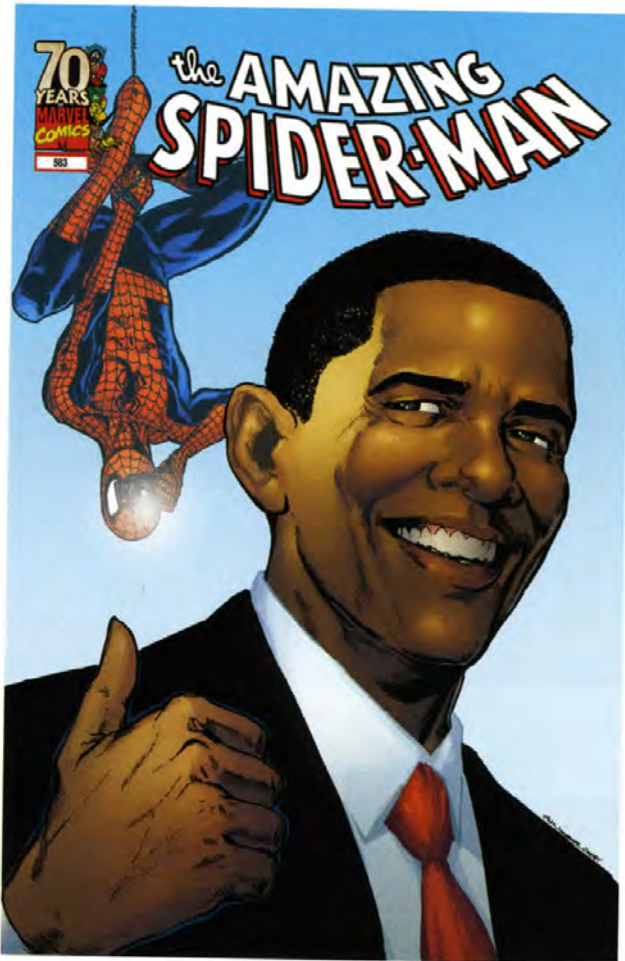
middle ground. The artist provides us with a special vantage point to view the narrative and brightens their intimate space. The artist also uses visual metaphors to express the lovers' desire in "the passionate undulation of entwining tree trunks, twisting leaves, and ecstatic flowers that in effect embrace the lovers in a cosmic nest."<sup>8</sup>

In another narrative based in religious beliefs, sixteenth-century Flemish artist Pieter Bruegel presents *The Tower of Babel* (5.20), also using the devices

of foreground, middle ground, and background. In the foreground we see men carving stones for construction of a tower. The tower itself takes up the middle ground and most of the space of the painting. The artist has made it the central interest of the biblical narrative of the people of Babylon, in their pride, struggling to build a tower to heaven. The background consists of everything beyond the tower. Bruegel includes a cloud in the middle ground at the top of the tower to indicate how high the tower has risen.

**Size.** The use of size variations to indicate spatial relationships can be clearly seen in the special edition cover from *The Amazing Spider-Man #583* (5.21), produced in honor of the inauguration of President Barack Obama. The artists have placed the smiling face of the president in the middle ground, with his thumbs-up gesture in the foreground. Spider-Man hangs behind the president, taking his picture with a flash camera. The artists have made Spider-Man about the size of the president's head and shoulders. If the president and Spider-Man were both standing beside each other, they would be rendered as about the same size. By making Spider-Man small, the artists indicate that he is at a distance behind the president.

**Overlap.** We have learned to see a thing that overlaps another thing as being in front of what it covers; therefore, you can also suggest depth through the placement of objects or shapes. *Trees* (5.22) is one of many preliminary studies Georges Seurat made for *A Sunday*



5.21 MARVEL COMICS Cover of *The Amazing Spider-Man* #583, January 2009.

*Afternoon on the Island of La Grande Jatte*, 1884, his large painting famously made entirely of discrete painted dots. In *Trees*, Seurat uses overlap, as well as size, to indicate distance. The foreground tree appears closest to us because of its large size, and the other trees appear to be in the background because they are smaller, and this effect is heightened by the way the large tree overlaps the smaller trees.

Robert Motherwell also suggests spatial depth in his nonobjective painting *Elegy to the Spanish Republic No. 34* (5.23) by using overlap and size. The black shapes on the canvas appear closest to us because they overlap the white, yellow, red, green, and other shapes behind them. The black shape is also the largest shape in the painting. Motherwell's *Elegy* series commemorates the Spanish who were obliterated by fascist dictator Generalissimo Franco during the Spanish Civil War in the 1930s when they



5.22 GEORGES SEURAT *Trees* (study for *La Grande Jatte*), 1884. Black Conté crayon on white laid paper, laid down on cream board, 620 × 475 mm.



5.23 ROBERT MOTHERWELL *Elegy to the Spanish Republic No. 34*, 1953–1954. Oil on canvas support, 80 × 100 in.



5.24 DINH Q LE *Night Vision*, 2008. C-print and linen tape, 49½ × 93¾ in.



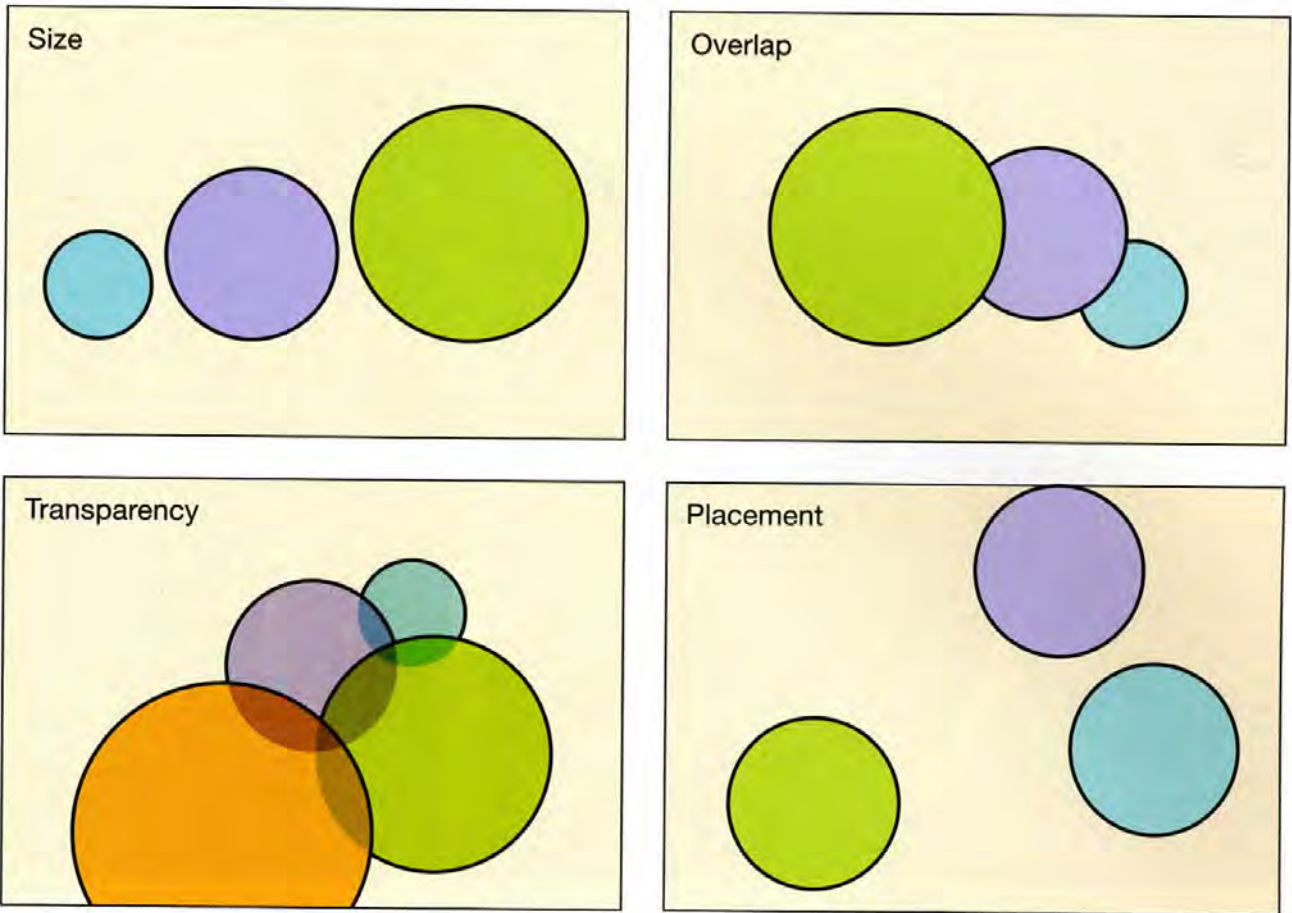
5.25 GEORGIA O'KEEFFE *Petunia No. 2*, 1924. Oil on canvas, 36 × 30 in.

tried to form a democracy. Perhaps Motherwell metaphorically obliterates the smaller victims with the massive black shapes on top of them.

**Transparency.** Dinh Q Le, an immigrant to the United States from Vietnam, suggests special depth by use of transparency in his pixelated photograph *Night Vision* (5.24). On the right side of the composition, a distressed woman seems to be trapped behind a screen of enlarged pixels, seemingly attempting to push through the picture surface but unable to because of the obstacle that seems to be in front of her.

**Placement.** Another way to indicate illusionary depth on a two-dimensional plane is to have elements near the top of a planar surface appear to recede, while those at the bottom seem to advance. Georgia O'Keeffe's painting (5.25) clearly illustrates this phenomenon. The petunia flower shapes at the bottom of the plane seems closest to us while the petunia behind the curved dark horizon line on top of them seems to recede in space.

Figure 5.26 visually summarizes ways of suggesting spatial depth on a two-dimensional plane. The techniques are effective in both representational and non-objective artifacts.



5.26 The use of size, overlap, transparency, and placement to indicate spatial illusions.

## Types of Perspective

Artists through time and across cultures have invented and refined optical and mathematical conventions, or techniques, for indicating the illusion of space on planar surfaces. The general term for this is **perspective**, but it has many forms. Major perspectival devices include atmospheric perspective, linear perspective, isometric perspective, and multiple perspective.

### ATMOSPHERIC PERSPECTIVE

Making objects that are close to the viewer appear crisp and vibrant, and making them fuzzy and less intense in color and tone as they recede from the viewer, is a technique called **atmospheric perspective**, or **aerial perspective**.

In actual space, things seem to diminish in clarity, intensity, and size the farther away they are from the viewer. Objects in the distance appear hazier and bluer, hues are duller, and tones are neither extremely dark nor extremely white. Textures appear coarse up close and fine from a distance. On a humid day, the moisture in the air diminishes clarity. Viewed from Chicago's

western suburbs, the John Hancock Building in the downtown area will appear light gray rather than its actual black. Even on a clear day, the whole Chicago skyline will appear softly textured, hazy, and bluish. On a misty day, it will seem to lack all color except light gray.

Annie Leibovitz's photographic landscape (5.27) captures the effects of atmospheric perspective. The birch trees that appear closest to us are the lightest in tone, and the ground appears darkest. As the trees behind those in front recede from our view, they appear gray. The textures of the branches of the trees closest to us are sharp, but as the trees recede from us, the textures in the background soften. She takes advantage of the natural effects of environmental conditions on the physical behavior of light, which cause the phenomenon of atmospheric perspective.

Just as humid days increase the hazy quality in the distance due to moisture in the air, high levels of pollution affect the color, contrast, and saturation of light traveling through it. You can deliberately reproduce these phenomena in order to suggest depth by lightening values and softening details and textures.

In his drawing of trees (see 5.22), Seurat employed atmospheric perspective when he made the foreground



5.27 ANNIE LEIBOVITZ *Pitch Pines and Gray Birch in the Dwarf Pine Ridges, Ellenville, New York, 2001*. Black-and-white photograph.

tree crisp, the trees in the middle ground less crisp, and those in the background blurred. He made the textures of the leaves in the distance soft. The features of the trees in the background are less distinct than those in the foreground. Similarly, in the Spider-Man comic panel (see 5.21), the artists made Spider-Man in colors less saturated than those they used for President Obama.

## LINEAR PERSPECTIVE

Use of linear perspective enables you to develop objects or figures of known size and to place them at various distances within the fictive space of a flat picture. Knowledge and use of linear perspective reach far back to ancient times. Research from the early Renaissance in the late 1400s by such artists as Filippo Brunelleschi and Leon Battista Alberti in Florence contributed to the science of depicting three-dimensional spaces on two-dimensional surfaces. Renaissance ideas were likely informed by prior research by Muslim scholars in Istanbul and Baghdad a century earlier, and these ideas were likely initiated in China as far back as the fifth century BCE. Modern-day cameras were invented to

render the illusion of three-dimensional space in linear perspective on a two-dimensional surface. Early experiments allowed images of the world to be projected on a wall in a dark room with such devices as a *camera obscura*. Later in history, through trial and error, artists learned to focus and fix otherwise fleeting images on chemically treated plates, such as a daguerreotype, and eventually on paper, which we now commonly call “photographs.”

Thus, **linear perspective** is an invented system of rendering the appearance of three dimensions on a two-dimensional plane by making objects appear smaller as they recede from us and by making parallel lines converge in the distance at a vanishing point on a horizon line. A **vanishing point** is where converging lines seem to disappear into a distant dot on the horizon line of a three-dimensional scene on a two-dimensional surface. A **horizon line** is where the sky meets the ground in the world or in a perspectival representation of it.

*The Road West* by Dorothea Lange (5.28) is a photograph that clearly provides an example of a flat paper image of a three-dimensional space in the real world. The parallel lines of the sides of the actual road seem to converge in the photograph to one vanishing point

where the land meets the sky in the distant horizon. Lange is effectively using the built-in perspectival rendering system of the camera for expressive purposes. Lange took a photo of this stretch of desolate land along U.S. 54 in southern New Mexico during the Depression. Many families took this route to look for work in California, which they found no more prosperous than the places they had left. Someone Lange met on the road said, "They keep the road hot a goin' and a comin' . . . They've got roamin' in their head."<sup>9</sup>

There are three major systems of linear perspective: one-point perspective, two-point perspective, and three-point perspective. All of them use **orthogonal lines**, that is, lines or edges in a picture that lead the viewer's eyes to the vanishing points in an illusionary three-dimensional space (5.29).

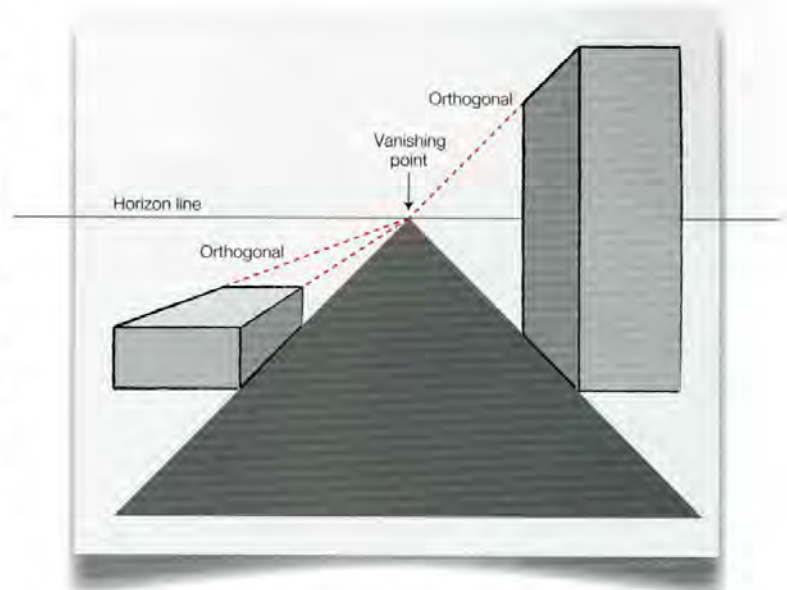
In order to render space within the linear perspective system, you can imagine the flat, two-dimensional picture surface, or **picture plane**, as a window onto a scene. Looking straight ahead with your line of sight parallel to the ground, you focus one eye on a fixed spot in the distance, called a "fixation point." Your **eye level** (5.30), which represents the elevation of your eyes, establishes the horizon line, where you can place one or more vanishing points. When creating illusions of space that do not seem distorted, you are limited to drawing objects that appear within your 45-degree viewing angle, known as the **cone of vision**, which can be positioned from top, bottom, left, or right.

**One-Point Perspective.** In **one-point perspective**, there is only one vanishing point on the horizon line. The result can be dramatic, drawing the viewer into the scene. Pietro Perugino's fresco *The Delivery of the Keys* (5.31), in the Sistine Chapel, Rome, exemplifies such an effect. Figure 5.32 shows two cubes rendered in one-point perspective. The cube on top is placed above the horizon line; the cube on the bottom, below the horizon line. The orthogonal lines used to render both cubes have a single vanishing point.

The artists who created the Spider-Man panel (5.33) used one-point perspective. You can locate the vanishing point by following the cables on which the characters climb. They recede to a point where the cables meet the masonry of the bridge, towards the middle left of the picture.



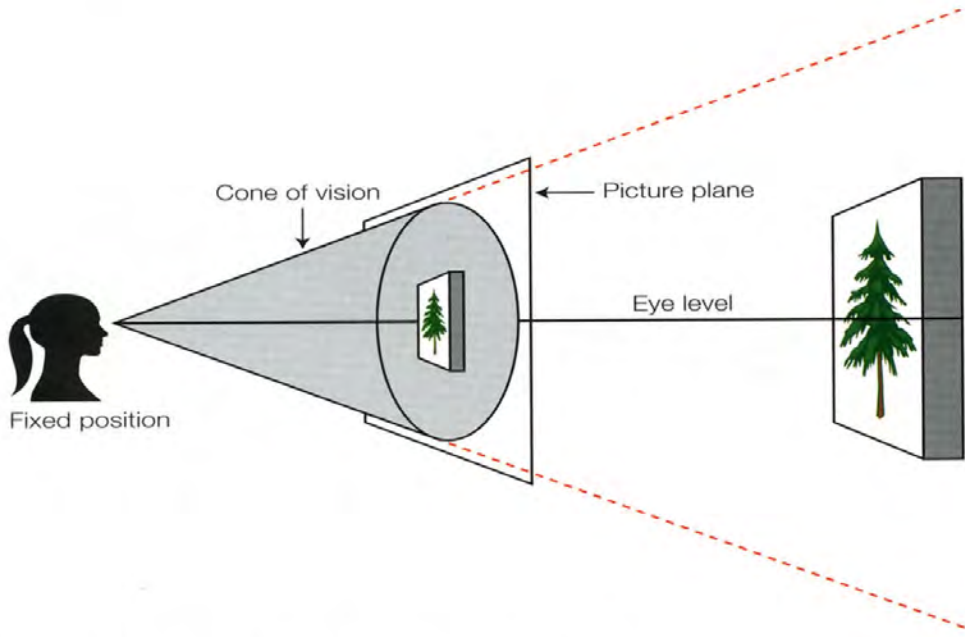
5.28 **DOROTHEA LANGE** *The Road West*, 1938. Gelatin silver photograph, 11 × 14 in.



5.29 **Linear perspective** is achieved by using orthogonal lines that lead the viewers' eyes to vanishing points.

**Two-Point Perspective.** Some renderings use two vanishing points in what is called **two-point perspective**. The use of two or more vanishing points allows you to depict an image from more than one diagonal direction (5.34; 5.35). This has the potential to make a scene livelier.

Ed Ruscha rendered *Standard Station* (5.36) in two-point perspective. Ruscha, the influential Los Angeles artist, is known for his visual explorations of words, images, and objects in landscapes. Through his dramatic use of two-point perspective, he turns an ordinary site into a mysterious symbol of the American vernacular landscape.



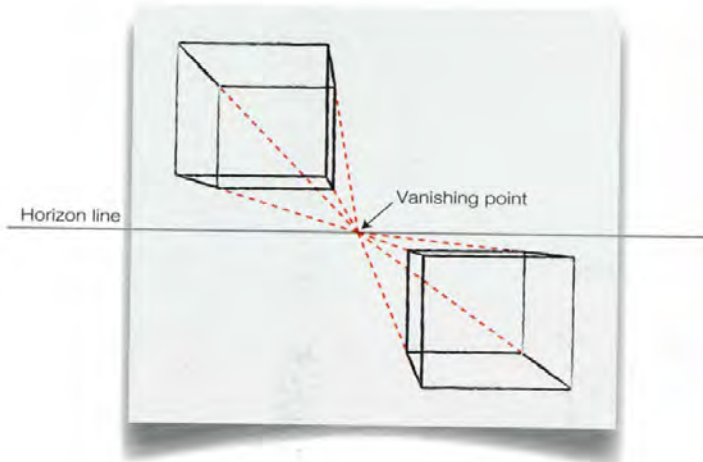
5.30 Rendering space within the linear perspective system.



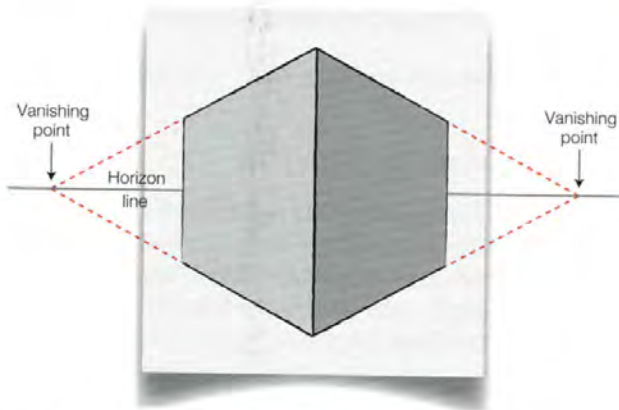
5.31 PIETRO PERUGINO *The Delivery of the Keys*, 1481–1482. Fresco. Lines added to show one-point perspective.

Orthogonal

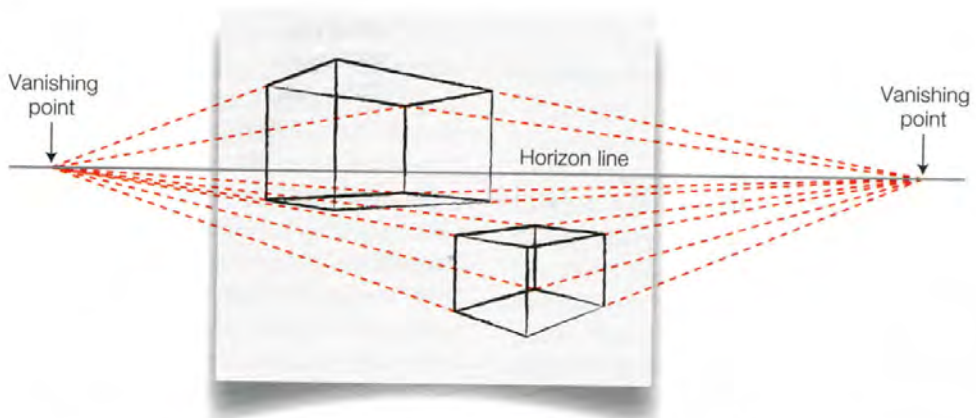




5.32 One-point perspective.



5.34 Two-point perspective. The orthogonal lines of this rendering of a cube merge at two vanishing points on the left and right of the horizon line.



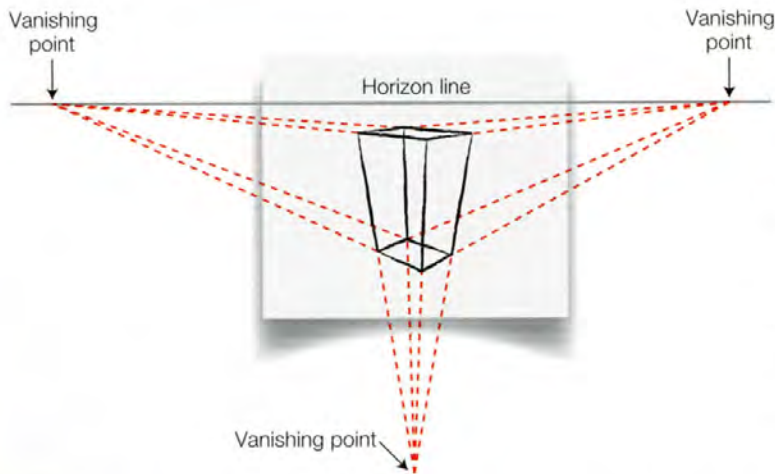
5.35 Two objects rendered in two-point perspective, one above and the other below the horizon line.



5.33 MARVEL COMICS COVER OF *Amazing Spider-Man* #512.



5.36 **ED RUSCHA** *Standard Station*, 1966. Screenprint, printed in color composition,  $19\frac{1}{2} \times 36\frac{15}{16}$  in.



5.37 **An object rendered in three-point perspective** using three vanishing points at and below the horizon line.

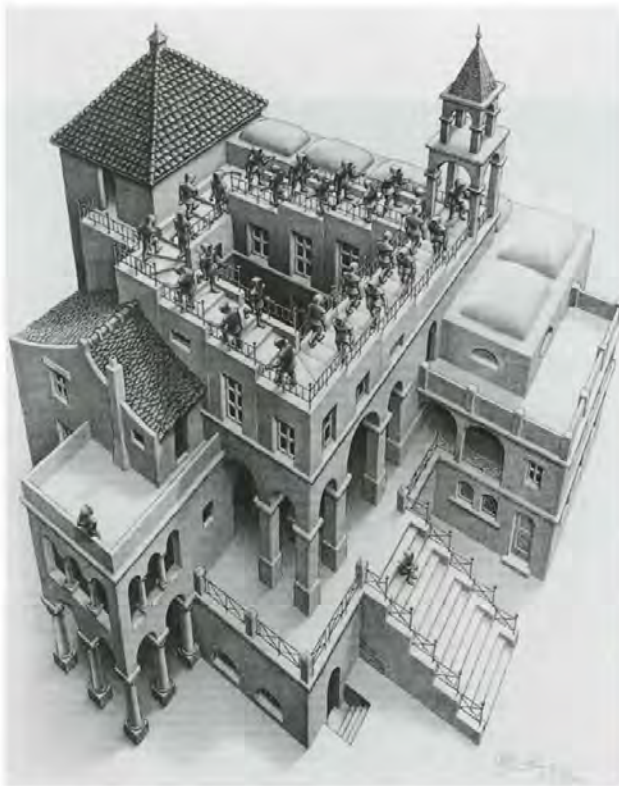
**Three-Point Perspective.** You can use **three-point perspective** (5.37; 5.38) when you wish to present an exaggerated point of view, usually above or below eye level. Three-point perspective is often used to render buildings from above or below. In addition to using two vanishing points, one for each wall of a building, you add a third vanishing point below the horizon line, and the walls then seem to recede into the ground. By placing the third vanishing point high in space, you can create a view looking up at a building.

## POINTS OF VIEW

The eye level you establish in a picture will affect the viewer's understanding of the picture and emotional reaction to it. When you place the viewer's eye level below a figure or object in your work, the viewer will look up at the figure, and the figure will seem more powerful than if it were viewed from above. In narrative filmmaking, for example, the director commonly has the cinematographer place the camera in such a way that it looks up to a menacing character in order to make the character all the more intimidating. When the menacing character is defeated, the camera will conventionally point down at the figure, giving viewers a feeling of superiority. Thus relations of power and subordination are commonly built into chosen points of view in pictures of all kinds.

**Bird's-Eye View.** As the name suggests, a **bird's-eye view** provides a point of view from a high level that looks down upon a space, person, or object. In figure 5.39, we see Captain Marvel from above as he plummets with shattered glass from high up in a skyscraper toward the street below. The view from above heightens our sense of the danger of Captain Marvel's situation.

**Worm's-Eye View.** In a panel of a Spider-Man comic (5.40), we see a superhero from a **worm's-eye view**,



5.38 M. C. ESCHER *Ascending and Descending*, 1960.

a point of view from a very low level looking up at a space, person, or object. We see Spider-Man in action—his camera swings from his shoulder as he alights on a wall while removing his mask—from a low angle of view that makes him seem all the more powerful to us. By providing a worm’s-eye view of Spider-Man, the artists imply his superheroic physical ability and psychological power.

**Foreshortening.** Through a technique known as **foreshortening**, you can create the illusion of an object extending back into space by making the part farthest from the picture plane smaller than it would be if the object were placed upright. You simultaneously render the part of the object closest to the picture plane larger. In an ad for Tony’s Pizza (5.41), the artist uses foreshortening, or what some instructors refer to as “amplified perspective.” By making the skates and hand very large in comparison to the head, the artist creates the illusion that the skater is airborne, skating above us, as he enjoys his pizza. The artist also rendered the slice of pizza disproportionately large, directing our gaze at the product being advertised. Exaggerated space is the dominant element in this image.

## ISOMETRIC PERSPECTIVE

Another technical system developed to depict three-dimensional space on a two-dimensional plane is



5.39 *Bird’s-eye view.* Cover of *Captain Marvel #3*, Marvel Comics.

isometry, which means equality within measurement. Whereas in linear perspective, parallel lines are drawn to come together as they recede from the viewer, in **isometric perspective**, lines remain parallel, and no lines are parallel to the picture plane (5.42). Isometric perspective is useful for technical illustration and drafting. Architects, interior designers, engineers, and craftspeople commonly use it when they need to show all measurements in proper proportion at the same time. In figure 5.43, the building is drawn in elevation, that is, flattened out with accurate dimensions of the building.

Although used primarily for technical purposes, isometric perspective can also be used for expressive purposes. The explosion of ideas in figure 5.44 is illustrated in the form of letters rendered in isometric perspective arising from a container, also drawn in isometric perspective. The illustration accompanies an article on new ideas of the year. The editors of the magazine ask us to “note the three-dimensional font created for the issue by the type designer Chester Jenkins, whose letters—inspired by the children’s alphabet blocks that so often accompany the acquisition of language—seem to become legible and reveal themselves only when viewed from just the right perspective.”<sup>10</sup>

- Think of value in terms of two distinct groups—areas of shadow and areas of light. Simplify your value structure. Do not allow these two separate areas to overlap or get mixed up. In general, any value associated with lit planes or surfaces should always be lighter than any value associated with planes or surfaces in shadow.
- The greatest contrast of value should occur between general massed areas of light and general massed areas of shadow.
- If possible, keep the balance or proportional relationship of values (light, medium, dark) uneven or irregular. If possible, avoid an equal amount of light, medium, and dark values to create a more interesting composition and to allow one value category to dominate your composition.



**Figure 1-135.** Student work. Carolee Heynen. Detail is sacrificed in favor of emphasizing the large, simplified planes of light and shadow in this 6-minute sustained gesture drawing. Generalized tonal structure is translated into approximately three values—dark, medium, and light (paper tone).

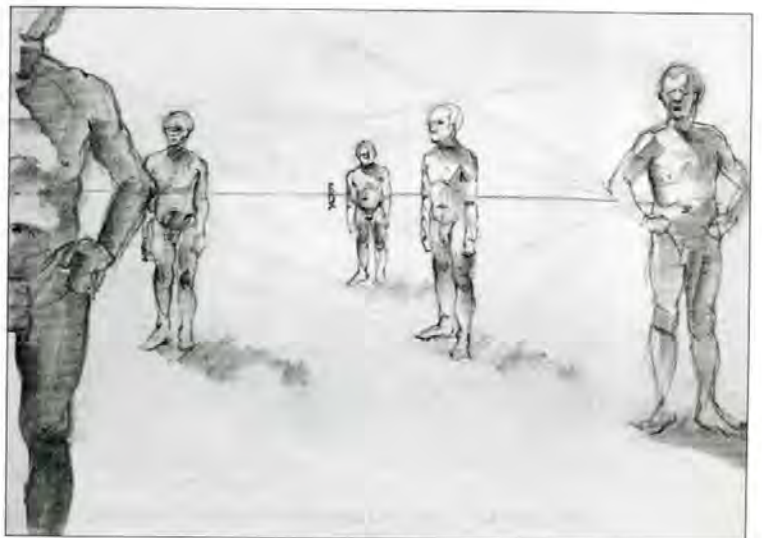
## The Illusion of Space and Depth on a Two-Dimensional Surface

### METHODS FOR INDICATING SPACE AND DEPTH

When attempting to convey a sense of space or depth on a flat or two-dimensional surface, you should carefully consider certain variables. These variables, when applied with awareness of their potential to emphasize or deemphasize space, can substantially increase or decrease the illusion of depth or distance in your drawing. These variables include size, baseline or position, overlapping, sharp and diminishing detail, converging parallels, and linear perspective.

**Size:** Large forms suggest nearness, while smaller forms suggest distance. Two objects or forms that are in reality exactly the same size will appear different in size when one object is positioned closer to us or when one object is positioned farther from us (Figure 1-136). Limiting size variation decreases the sense of space, while expanding on size variation increases the sense of space.

**Baseline or position:** Baseline refers to the imaginary point at which an object makes contact with a ground plane. The position or spatial location of objects is judged in relation to the horizon line (eye



**Figure 1-136.** Student work. Jody Williams. The graduated size and placement of these standing male figures create a strong illusion of depth and space.

level). The bottom of the picture plane or drawing format is seen as the closest visual point to the viewer, and the degree to which a form “rises” on the page toward the horizon line or eye level indicates increasing depth or receding spatial positions (Figure 1-137). This relationship is reversed when we are dealing with forms that are floating above the horizon line or eye level; clouds are a good example of this. As a cloud is positioned lower on the page, closer to the horizon line or eye level, it is perceived as being farther away; as a cloud is positioned higher on the page, farther from the horizon line or eye level, it is perceived as being closer (Figure 1-138). Varying the baseline or position of objects increases the sense of space, while a lack of variety of baseline or position decreases the sense of space.

**Overlapping:** If one object covers part of the visible surface of another object, overlapping occurs and the first object is assumed to be nearer. The object that is most visible or complete is perceived to be nearer than the object that is partially hidden due to over-

lapping. Keep in mind that overlapping can contradict the spatial indicator of diminishing size if a smaller form overlaps a larger form (Figure 1-139). Minimal instances of overlapping decrease the sense of space, while numerous instances of overlapping increase the sense of space.

**Sharp and diminishing detail:** Close objects appear sharp and clear in definition, while objects at great distances appear softer and lacking in definition, focus, and detail. Close objects will reveal more texture, while distant objects appear to have less texture. Minimizing differences in clarity and detail will decrease the sense of space, while maximizing differences in clarity and detail will increase the sense of space (Figure 1-140).

**Value contrast:** Close objects will reveal a fuller value range (higher contrast), while distant objects will reveal a limited value range with a reduction in strong darks and/or strong lights (low contrast). High contrast advances, while low contrast recedes. This is related to the concept of atmospheric perspective.



**Figure 1-137.** Wayne Thiebaud, American, *Untitled (Lipsticks)*, 1972. Pastel on paper, 16 × 20 inches. Photograph courtesy of the Allan Stone Gallery, New York, NY. Art © Wayne Thiebaud/Licensed by VAGA, New York, NY. Thiebaud's study of tubes of lipstick provides an excellent example of shifting baselines as an indicator of the spatial position of forms. As the tubes of lipsticks are positioned higher on the drawing surface, they appear to be farther back in space.



**Figure 1-138.** Deborah Rockman, American, *Skyscape No. 2*, 1990. Oil pastel on gessoed paper, 48 × 30 inches. Collection of Calvin College, Grand Rapids, MI. Contrary to forms on the ground plane, clouds or any other forms that are above our eye level are perceived as farther away as they approach the bottom of a composition and are perceived as nearer as they approach the top of a composition.



**Figure 1-139.** Student work. Clarkson Thorp. The many instances of overlapping in this still life help to reinforce the illusion of space or depth. Note that there are many examples of spatial contradiction as smaller forms repeatedly overlap larger forms.



**Figure 1-140.** Student work. This drawing, the result of looking down on one's own body, uses changes in contrast and detail to reinforce depth and space. The forms in the foreground are sharp and clear, with detail and full value contrast. The forms in the background are softer in focus, with less value contrast and detail.

Minimizing value contrast will decrease the sense of space, while maximizing value contrast will increase the sense of space.

The notion of value contrast in relation to space is often misunderstood. If objects are receding into a light space, value contrast will diminish toward the light end of the value scale, with fewer dark values (Figure 1-141). If, however, objects are receding into a dark space, value contrast will diminish toward the dark end of the value scale, with fewer light values (Figure 1-142).

**Converging parallels:** Any set of parallel lines (a railroad track, for example) will appear to converge or meet as they move back in space and away from the viewer toward the horizon line. This idea is closely related to linear perspective (Figure 1-143). A minimal rate of convergence will diminish the sense of space, while an increased rate of convergence will heighten the sense of space.

**Linear perspective:** A geometric/mathematical system is used for converting sizes and distances of

**Figure 1-141.** Student work. As the plant forms move from the foreground to the background on this white drawing surface, the value range diminishes toward the light end of the value scale, joining the distant plant forms more closely with the light paper tone.



**Figure 1-142.** Student work. Stacy Cossolini. As the forms in this still life move from the foreground toward the dark background, the value range diminishes toward the dark end of the value scale, joining those forms more closely with the dark background values.

