the visual connection between the illusionistically rendered objects within—and actual objects outside—the painting imply motion; that is, the ejection of objects from the painting into the gallery space.

THE FOURTH DIMENSION

We live in the fourth dimension, meaning one that has length, width, height, and time. In the performing arts, works unfold in actual time at a specific location: operas, symphonies, choreographed ballets, or performance art pieces—such as Dennis Oppenheim's

Reading Position for a Second Degree Burn (Fig. 8.20)—have a beginning, an end, and are of certain duration. The details describing the process and the result in Oppenheim's work are in a caption that separates the "before and after" photographs of the artist: "Stage 1 and Stage 2. Book, skin, solar energy, exposure time 5 hours. Jones Beach, 1970."

Implied time is the portrayal or suggestion of the passage or duration of time. In an illustration from the medieval Moutier-Grandval Bible (Fig. 8.21), the story of Adam and Eve, from their creation by God through their bitter struggles after expulsion from the Garden of Eden, is told in four, friezelike

bands using figure repetition. The details of the setting are kept to a minimum, focusing our attention on the principal characters and the progression of the narrative.

TIME AND MOTION

In earlier chapters we have seen how artists use the elements of art in works that are two- or three-dimensional. We have seen strategies for creating the illusion of three dimensions (length, width, height, and depth) on a two-

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implied time / The portrayal or suggestion of the passage or duration of time.

∧ **8.20** Dennis Oppenheim. *Reading Position for a Second Degree Burn* **(1970)** Color photography and collage (85" × 59 7/8"). Stage 1 and Stage 2. Book, skin, solar energy, exposure time 5 hours. Jones Beach, 1970.
© Dennis Oppenheim. Courtesy of Dennis Oppenheim Estate.

∧ **8.21** **Scenes from Genesis** (c. 840) Illustration in the Moutier-Grandval Bible (20" × 14 3/4").

dimensional surface. We have also seen, in kinetic art, the incorporation of movement in three-dimensional works of art but have not yet discussed the role of time in such works. Motion occurs over time—**duration**—thus the two are inextricably woven; without time, all existence and all images are static. Film, video, and computer-based technologies—called time-based mediums—are best suited to time-based works of art, that is, works in which duration is a dimension. Just as some artists manipulate elements of art to create illusions of three dimensions, so do others—like Tony Oursler (Fig. 8.22)—use time-based mediums to create the illusion of movement and duration. The history of time and motion in time-based art is woven into the history and technology of motion pictures.
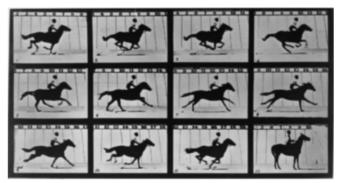
Motion Pictures: Film and Video

Eadweard Muybridge's *Galloping Horse* (Fig. 8.23) sequence was shot in 1878 by 24 cameras placed alongside a race-track; it was made possible by new, fast-acting photosensitive plates. Muybridge had been commissioned to settle a bet as to whether racehorses ever had all four hooves off the ground at once. He found that they did, but also that they never assumed the rocking-horse position in which the front and back legs are simultaneously extended.

Muybridge is generally credited with performing the first successful experiments in making motion pictures. He fashioned a device that could photograph a rapid sequence of images, along with one that could project these images onto a screen. Muybridge's process was the opposite of Edgerton's, who, many decades later, froze each and every fraction of actual motion in a single image. Muybridge combined numerous individual photographs of a moving object into a sequence that, if viewed in rapid succession, gave the illusion of actual motion.

duration / Over time.

∧ **8.22** Tony Oursler. *Mirror Maze (Dead Eyes Live)* (2004) Installation view at the Cartier Foundation Gallery, Paris.

∧ **8.23** Eadweard Muybridge. *Galloping Horse* (1878) Collotype print.

TRY THIS

Create your own short performative stop-motion scene on paper. Plan some sort of action using either your own body or a malleable object such as a puppet or a handful of clay. Photo document every small movement within your scene, and print each photograph on whatever paper you'd like. Bind these pages together, in sequence, into a flipbook. When flipping through it, how fluid is the movement, and how did the number of frames you chose to shoot while covering the action affect this fluidity? Is something revealed through this process that is different than simply videotaping the same action?

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▲ **8.24** Hugh Hudson, Director. Film Still from *Chariots of Fire* (1981).

The birth of motion pictures, or cinema, was the result of specific inventions including **film** (images printed on celluloid and cut into strips) and a motion picture viewing device in which a sequence of images (individual frames) on film (something like Muybridge's galloping horse) were passed over a lamp, the light from which was broken into quick flashes by a revolving shutter placed between the film and the lamp. The light flashes illuminated each frame and the rapidity of the progression of the frames—16 to 24 pictures, or frames per second—along with the phenomenon of persistence of vision created the illusion of motion.

The medium of **video** records and plays back images differently, but the principle is similar to that of film. As with film cameras, video cameras capture and record a series of still images that are then constructed into a moving picture. With video, sights and sounds are *digitized*—that is, they are transformed into electronic messages in the form of lengthy codes (a pattern of ones and zeros). The information is stored (as on videotape or memory cards) or transmitted through the air (broadcast) or via cable. Ultimately, the digitized information is projected on a surface or received and displayed on a monitor that transforms it into visual images that consist of hundreds of lines of light and dark and color. The more lines there are, the higher the **resolution** or sharpness of the picture will be. As with film, the viewer is shown a series of still images in rapid succession—fleeting images that create the illusion of movement and the passage of time.

Manipulating Time

At a viewing rate of 24 frames per second (fps), motion in a film appears smooth, natural, and realistic. Slow motion, on the other hand, creates the appearance that time has slowed down and directs or holds our focus. It can be used to give us a strong impression of the personalities of characters, as in the famous opening scene of Hugh Hudson's *Chariots of Fire* (Fig. 8.24) or the opening credits of Quentin Tarantino's *Reservoir Dogs* (Fig. 8.25). It can also isolate specific details of actions that would otherwise be fleeting to our eyes. Achieving slow motion is not a matter of shooting fewer frames or slowing down the number of frames per second that we see; rather, slow motion is achieved by shooting at a frame rate *faster* than 24 frames per second (for example, 48, 60, or 120 fps). When the films are played back at 24 fps, movement appears to be slowed down. Slow-motion—and fast-motion—clips are sometimes juxtaposed with each other and with 24 fps sequences to disrupt

film / Images printed on celluloid and cut into strips.

video / A medium that, as cinematography, creates the illusion of motion by taking many pictures per second. However, the pictures are digitized and stored and retrieved electronically.

resolution / The sharpness of a picture as measured, for example, by the number of lines or pixels in a video presentation.

▲ **8.25** Quentin Tarantino, Director. Film Still from *Reservoir Dogs* (1992).

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∧ **8.26** Michel Gondry, Director. Film Still from *The Green Hornet* (2011).

the predictable pace of a scene. Michel Gondry's *The Green Hornet* (Fig. 8.26) features these juxtapositions to great effect.

Andy Wachowski and Lana Wachowski's film *The Matrix* includes groundbreaking slow-motion effects known as *bullet time* in which multiple cameras, arranged at multiple angles and vantage points (above, below, alongside of, in front of, and behind the action), capture the scene in many thousands of still images. The frames are then assembled with the aid of a computer to create the illusion of frozen time or slowly moving time, as when Neo, the main character in *The Matrix*, acrobatically dodges bullets and plucks them out of the air (Fig. 8.27).

EDITING. The manipulation of time begins with camerawork and comes to fruition with editing—the process of selecting, assembling, and sequencing raw shots (filmed details of the action) and effects and combining them into an aesthetic, expressive whole.

Editing techniques are used to construct cohesive and coherent narratives and heighten dramatic impact. A few commonly used examples are *cutting on action*, *jump cut*, *match cut*, *parallel action*, and *montage*.

Cutting on action is a "continuity editing" technique that is used within a scene to create the illusion of spatial and temporal continuity *through* an edit point (through the "cut" that joins the two shots together). Two different angles of the same action are both filmed, and the edit point (the cut) is placed midaction to connect the two shots, seemingly in *real-time*.

Unlike *cutting on action*, which aims to make an edit seamless, the *jump cut*

∧ **8.27** Andy Wachowski and Lana Wachowski, Directors. Film Still from *The Matrix* (1999).

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∧ **8.28** Jean-Luc Godard, Director. Film Still from *Breathless* (1960).

shot of one object to a shot of another similarly shaped object, a metaphorical connection can be made between them that wouldn't be obvious otherwise. An example of this is seen in the shower scene in Alfred Hitchcock's *Psycho* (http://movieclips.com, "*Psycho* 'The Shower' " at 2:05), in which a close-up shot of the round shower drain is juxtaposed with a close-up shot of the dying woman's round eye. Two stills from the shower scene are featured in Figure 8.29.

Parallel action editing employs the technique of *cross-cutting*, the act of cutting back and forth between two different scenes, thereby interweaving them and creating a meaningful connection between them. *Cross-cutting* can create the illusion that both scenes are happening simultaneously, even if they are in different locations.

edit is intentionally jarring and can be used to condense time. Instead of using multiple shots that are taken from significantly different angles, this technique cuts from one angle to a similar angle (or even a later point within the same shot), thereby disrupting the temporal or spatial continuity of a scene. This gives the viewer a sense of jumping forward in time, which can create tension and be unsettling. The car scene in Jean-Luc Godard's *Breathless* is a classic example of the jump cut (http://www.youtube.com, "*À bout de souffle [Breathless]* Jean Luc Godard Car Scene" at 0:12). The character Patricia (seen in another scene in Fig. 8.28) is riding in a car and is filmed from the same camera position behind her to the left. We see her with her hands in her lap when, all of a sudden, the film cuts to her looking into a small mirror. The action of raising the mirror is missing; the scene jumps from one moment in the action to the other with an obvious gap.

A *match cut*, also known as a *graphic match*, is an edit between two different objects that share similar visual qualities, such as shape. By cutting from a

a.

b.

> **8.29a and 8.29b** Alfred Hitchcock, Director. Film Stills from *Psycho* (1960).

a.

b.

c.

< **8.30** Sergei Eisenstein, Director. "Odessa Steps" Sequence from *The Battleship Potemkin* (1925).

The term *montage* refers to the technique of combining multiple, seemingly disparate shots into a cohesive sequence. The type of logic that is applied to montage editing exists outside the logic of temporal or spatial realism. Through *montage*, multiple spaces and time periods can be spliced together to create a new narrative connection between them. A montage sequence has a special opportunity to collapse time by jumping from moment to moment, allowing days, weeks, or years to take place within only a few seconds or minutes of screen time. Montage appeared first in Sergei Eisenstein's influential and critically acclaimed film *The Battleship Potemkin* (Fig. 8.30a, 8.30b, and 8.30c). The "Odessa Steps" sequence, in which Tsarist soldiers massacre Odessa civilians, is one of the most well-known scenes in the history of film.

TRY THIS

Think about ways of injecting the elements of time and motion into a still object that you create. How might it be possible to build something that over time will change into something else, or disappear altogether? Andy Goldsworthy has made many sculptures out of natural materials that are in turn installed in nature. Among his broad range of materials are ice and snow, which he uses to create site-specific sculptures that are certain to auto-destruct the moment the surrounding air begins to warm. An example of a more time-controlled state change of an object can be seen in the "sugar cube scene" in Krzysztof Kieślowski's film Blue from his trilogy Three Colors. The dramatic scene depicts the point of view of our main character, Julie, as she stares at a sugar cube melting in her coffee. The camera's hyperfocus on this melting sugar cube is meant to demonstrate Julie's fragile psychological state. Kieślowski felt that the sugar cube should melt within five seconds because the audience wouldn't want to watch it melting for any longer than that. He therefore tested brand after brand of sugar cube until he found the cube that melted at the most ideal speed. Keeping in mind the varied levels of control and chance embedded in these types of time-based practices, create a work of art that will change over time. Film it as it journeys from state to state.

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∧ **8.31** Seth MacFarlane, Director. Film Still from *Ted* (2012).

Animation

Animation creates the illusion of movement through the manipulation and duplication of, for example, drawings, computer-generated images, or clay figures. In traditional animation, each drawing differs slightly from the one preceding it, just as with photographs in early cinematography. Today computer graphics techniques are generally used to take one image and then modify it from frame to frame to create the illusion of movement more efficiently. Images used in animation can be generated entirely by computer. Sometimes they are inserted into filmed or videotaped environments in such a way as to mix art with reality (Fig. 8.31).

animation / A method of creating the illusion of movement through the manipulation and duplication of drawings, computer-generated images, clay figures, and the like.

∧ **8.32** Brad Bird, Director. Film Still from *The Incredibles* (2004).

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∧ **8.33** Tim Burton, Director. Film Still from *The Corpse Bride* (2005).

Many film studios use animation and computer graphics and styles vary widely, from Disney and Pixar's groundbreaking animated film *The Incredibles* (Fig. 8.32) to Tim Burton's *Corpse Bride* (Fig. 8.33) and, more recently, *Frankenweenie*. In both, Burton incorporated puppets constructed of stainless-steel armatures covered with foam latex or silicone. The puppets' movements were created using the tedious process of stop-motion animation. Photographs were taken with commercial digital still photography cameras and the editing was done using Apple's Final Cut Pro. According to *Corpse Bride* trivia, it took the animators twenty-eight separate shots just to make the bride blink. A very different effect was achieved using the same process of stop-motion animation in Wes Anderson's *Fantastic Mr. Fox* (Fig. 8.34a and 8.34b).

a.

> **8.34 a and 8.34b** Wes Anderson, Director. Film Still from *Fantastic Mr. Fox* (2009).

b.

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ARTISTS ON ART

Key Terms

animation (p. 172)
duration (p. 167)
film (p. 168)
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implied motion (p. 164)
implied time (p. 166)
kinetic art (p. 158)
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Why must art be static? You look at an abstraction, sculptured or painted, an entirely exciting arrangement of planes, spheres, nuclei, entirely without meaning. It would be perfect, but it is always still. The next step in sculpture is motion.
—Alexander Calder

To photograph is to hold one's breath, when all faculties converge to capture fleeting reality. It's at that precise moment that mastering an image becomes a great physical and intellectual joy.
—Henri Cartier-Bresson

The modern artist . . . is working and expressing an inner world—in other words—expressing the energy, the motion, and other inner forces.
—Jackson Pollock

I guess I'm fascinated with motion because I find that whenever anything is moving, I have some feeling about it. It doesn't matter what kind of motion it is. A motion will always evoke some kind of reaction.
—Arthur Ganson

The aim of every artist is to arrest motion, which is life, by artificial means and hold it fixed so that a hundred years later, when a stranger looks at it, it moves again since it is life.
—William Faulkner, novelist

We declare that that the splendor of the world has been enriched by a new beauty: the beauty of speed.
—Filippo Marinetti

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