Learning Objectives

After reading this chapter, you should be able to

✓ describe the differences among a shot, a setup, and a take.

✓ understand the role that a director of photography plays in film production.

✓ describe the basic characteristics of the cinematographic properties of a shot: film stock, lighting, and lenses.

✓ understand the basic elements of composition within the frame, including implied proximity to the camera, depth, camera angle and height, scale, and camera movement.

✓ define the rule of thirds.

✓ describe any shot in a movie by identifying
  • its proximity to its subject.
  • the angle of the camera.
  • the nature of camera movement, if any, within the shot.
  • the speed and length of the shot.

✓ understand the ways in which special effects are created and the various roles that special effects play in movies.

What Is Cinematography?

Cinematography is the process of capturing moving images on film or a digital storage device. The word comes to us from three Greek roots—kinesis, meaning “movement”; photo, meaning “light”; and graphia, meaning “writing”—but the word was coined only after motion pictures themselves were invented. Cinematography is closely related to still photography, but its methods and technologies clearly distinguish it from its static predecessor. This chapter introduces the major features of this unique craft.

Although cinematography might seem to exist solely to please our eyes with beautiful images, it is in fact an intricate language that can (and in the most complex and meaningful films, does) contribute to a movie’s overall meaning as much as the story, mise-en-scène, and acting do. The cinematographer (also known as the director of photography, or DP) uses the camera as a maker of meaning, just as the painter uses the brush or the writer uses the pen: the angles, heights, and movements of the camera function both as a set of techniques and as expressive material, the cinematic equivalent of brushstrokes or of nouns, verbs, and adjectives. So, in order to make an informed analysis and evaluation of a movie, we need to consider whether the cinematographer, in collaboration with the other filmmakers on the project, has successfully harnessed the powers of this visual language to help tell the story and convey the meaning(s) of the movie. As director Satyajit Ray puts it, “There is no such thing as good photography per se. It is either right for a certain kind of film, and therefore good; or wrong—however lush, well-composed, meticulous—and therefore bad.”

The Director of Photography

Every aspect of a movie’s preproduction—writing the script, casting the talent, imagining the look of the finished work, designing and creating the sets and costumes, and determining what will be placed in front of the camera and in what arrangement and manner—leads to the most vital step: representing the mise-en-scène on film or video. Although what we see on the screen reflects the vision and design of the filmmakers as a team, the director of photography is the primary person responsible for transforming the other aspects of moviemaking into moving images.

Freddie Young, who won Best Cinematography Oscars for three David Lean movies—Lawrence of Arabia (1962), Doctor Zhivago (1965), and Ryan’s Daughter (1970)—defines the DP’s job within the overall process of film production:

[The cinematographer] stands at the natural confluence of the two main streams of activity in the production of a film—where the imagination meets the reality of the film process.

Imagination is represented by the director, who in turn is heir to the ideas of the scriptwriter, as he is to those of the original author of the story. Three minds, and three contributing sources of imagination have shaped the film before the cameraman can begin to visualize it as a physical entity.²

In the ideal version of this working relationship, the director's vision shapes the process of rendering the mise-en-scène on film, but the cinematographer makes very specific decisions about how the movie will be photographed.

When the collaboration between the director and the cinematographer has been a good one, the images that we see on-screen correspond closely to what the director expected the DP to capture on film. As cinematographer John Alton explains,

> The screen offers the advantage of an ability (although we do not always utilize it) to photograph the story from the position from which the director thinks the audience would like to see it. The success of any particular film depends a great deal upon the ability of the director to anticipate the desires of the audience in this respect. . . .

> . . . [T]he director of photography visualizes the picture purely from a photographic point of view, as determined by lights and the moods of individual sequences and scenes. In other words, how to use angles, set-ups, lights, and camera as means to tell the story.³

As cinematographers translate visions into realities, however, they follow not inflexible rules but rather conventions, which are open to interpretation by the


artists entrusted with them. "You will accomplish much more," advises Gregg Toland—the cinematographer famous for such classics as John Ford's *The Grapes of Wrath* (1940), William Wyler's *The Best Years of Our Lives* (1946), and Orson Welles's *Citizen Kane* (1941)—"by fitting your photography to the story instead of limiting the story to the narrow confines of conventional photographic practice. And as you do so you'll learn that the movie camera is a flexible instrument, with many of its possibilities still unexplored."4

Many cinematographers succeed in "fitting [the] photography to the story." For example, in *The Lives of Others* (2006; director: Florian Henckel von Donnersmarck), the cinematographer Hagen Bogdanski, employs a flat lighting scheme and color palette to portray an ugly world of surveillance in which citizens are fearful, paranoid, and humiliated into submission to the Stasi, the secret police in Communist East Germany in the 1980s. Todd Louiso's *Love Liza* (2002) concerns the anguish of a man (played by Philip Seymour Hoffman) whose wife has killed herself. Lisa Rinzler, the cinematographer, influenced by German Expressionist movies, observes him from a 360-degree tracking shot and from striking angles shot with bold lighting to depict the emotional torment and physical clumsiness with which he confronts his despair.

The three key terms used in shooting a movie are shot, take, and setup. A shot is (1) one uninterrupted run of the camera and (2) the recording on film, video, or other medium resulting from that run. A shot can be as short or as long as necessary, with the obvious condition that it not exceed the time limitations of the medium on which the moving images are being recorded. The term take refers to the number of times a particular shot is taken. A setup is one camera position and everything associated with it. Whereas the shot is the basic building block of the film, the setup is the basic component of the film's production process and the component on which the director and the cinematographer spend the most time collaborating.

The cinematographer's responsibilities for each shot and setup (as well as for each take) fall into four broad categories:

1. cinematographic properties of the shot (film stock, lighting, lenses)
2. framing of the shot (proximity to the camera, depth, camera angle and height, scale, camera movement)
3. speed and length of the shot
4. special effects

Although these categories necessarily overlap, we will look at each one separately. In the process, we will also examine the tools and equipment involved and what they enable the cinematographer to do.

In carrying out these responsibilities, the DP relies on the assistance of the camera crew, who are divided into one group of technicians concerned with the camera and another concerned with electricity and lighting. The camera group consists of the camera operator, who does the actual shooting, and the assistant camerapersons (ACs). The first AC oversees everything having to do with the camera, lenses, supporting equipment, and the material on which the movie is being shot. The second AC prepares the slate that is used to identify each scene as it is shot, files camera reports, and when film stock is being used, feeds that stock into magazines that are then loaded onto the camera. The group concerned with electricity and lighting consists of the gaffer (chief electrician), best boy (first assistant electrician), other electricians, and grips (all-around handypersons who work with both the camera crew and the electrical crew to get the camera and lighting ready for shooting).

**Cinematographic Properties of the Shot**

The director of photography controls the cinematographic properties of the shot, those basics of motion-picture photography that make the movie

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In Cold Blood: serendipity creates an unforgettable shot. Although the director of photography must maintain strict control over the cinematographic properties of a movie's shots, every great cinematographer must also be alert to moments when an unplanned situation happens on the set that could make a shot even better than planned. In a climactic scene of In Cold Blood (1967; director: Richard Brooks), based on Truman Capote's masterpiece, cinematographer Conrad Hall took advantage of a chance observation—the juxtaposition of rain running down a window with a condemned murderer's last-minute remembrance of his father—to create a memorable moment of cinema. Just before his execution for the brutal murders of a Kansas family, Perry Smith (Robert Blake) remembers his father. As he moves toward the window and looks out at the prison yard, heavy rain courses down the window, making it appear that he is crying. With the strong exterior lights directed at Smith's face, cinematographer Conrad Hall explains that he found the setup for this shot when he realized that this situation "created these avenues for the bright light outside to come in. . . . It was an accident I saw, and used, and capitalized on the moment." This just helps to prove that a great shot can be the result of careful planning or, as in this case, serendipity.

Even though more movies are being shot on digital media with each passing year, the majority of feature films are still shot on traditional film stock. The two basic types of film stock—one to record images in black and white, the other to record them in color—are completely different and have their own technical properties and cinematic possibilities. Film stock is available in several standard gauges (widths measured in millimeters): 8mm, Super 8mm, 16mm, 35mm, 65mm, 70mm, as well as special-use formats such as IMAX, which is ten times bigger than a 35mm frame. (65mm film is used in the camera and then printed on 70mm film, which is used for projection; the additional space holds the sound track.) Before the advent of camcorders, 8mm and Super 8mm were popular gauges for amateurs (for home movies). Many television or student movies, as well as low-budget productions, are shot on 16mm. Most professional film stock

Film Stock

The cinematographer is responsible for choosing a recording medium for the movie that has the best chance of producing images corresponding to the director's vision. Among the alternatives available are film stocks of various sizes and speeds, videotape, and direct-to-digital media. A skilled cinematographer must know the technical properties and cinematic possibilities of each option and must be able to choose the medium that is best suited to the project as a whole.

Image appear the way it does. These properties include the film stock, lighting, and lenses. By employing variations of each property, the cinematographer modifies not only the camera's basic neutrality, but also the look of the finished image that the audience sees.
productions use either 16mm or 35mm. Generally, the wider the gauge, the more expensive the film and, all other factors being equal, the better the quality of the image.

Another variable aspect of film stock is its **speed** (or exposure index)—the degree to which it is light-sensitive. Film stocks that are extremely sensitive to light and thus useful in low-light situations are called fast; those that require a lot of light are called slow. There are uses for both slow and fast film stock, depending on the shooting environment and the desired visual outcome. Fast films are grainy (as larger grains of light-sensitive material need less light to record an image with a fast shutter speed), whereas slow films are fine-grained and require either a slow shutter speed, more light, or both. When a film’s look must uniquely match the demands of the story, cinematographers will mix film stocks (e.g., Oliver Stone’s *Natural Born Killers*, 1994; cinematographer: Robert Richardson or Tom Tykwer’s *Run Lola Run*, 1998; cinematographer: Frank Griebe) or intentionally use the wrong chemicals to process film stocks to achieve the desired look, as in David O. Russell’s *Three Kings* (1999; cinematographer: Newton Thomas Sigel).

Which stock is right for a particular film depends on the story being told. With only a few outstanding exceptions, however, virtually all movies are now shot in color; for that is what the public is accustomed to and therefore expects. As Figure 6.1 shows, when Hollywood began to use color film stock, only 1 percent of the feature releases from major studios in 1936 were in color. The growth of color production slowed during World War II because all film stock, especially color, was in short supply, but by 1968 virtually all feature releases were in color.

Although color can heighten the surface realism (if not the verisimilitude) and the spectacle of many stories, it is not suitable for all films. For example, films in the expressionist or film-noir styles are deliberately conceived to be shot in black and white; it’s almost impossible to imagine anyone having shot F. W. Murnau’s *Nosferatu* (1922), John Ford’s *The Informer* (1935), or Fritz Lang’s *The Big Heat* (1953) in color. During the 1970s and 1980s, certain television executives tried to “improve” the “old” movies they were showing on television with the process of **colorization**: using digital technology, they “painted” colors on movies meant by the

### FIGURE 6.1 Color Film Production, 1936–1968

<table>
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<tr>
<th>Year of release</th>
<th>Total number of feature releases from major studios</th>
<th>Percentage of releases in color</th>
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<td>1936</td>
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original filmmakers to be seen in black and white. The unimpressive results were limited by the state of computer graphics at the time, but even though computer technology has improved since then, the practice has abated. Many viewers, even those who grew up with color movies, could see that colorization was not an improvement for movies that had been shot in black and white. Film artists breathed a sigh of relief once it became clear that colorization was a failed experiment.

Although today the default choice for feature-film production is color, the period from 1940 to 1970 was a time during which the choice between color and black and white needed to be carefully considered, and many films shot in color during that period might have been even stronger if they had been shot instead in black and white. John Ford's The Searchers (1956; cinematographer: Winton C. Hoch), a psychological Western that is concerned less with the traditional Western's struggle between good and evil than with the lead character's struggle against personal demons, might have been an even more powerful film had it been shot in black and white instead of color. Doing so might have produced a visual mood, as in film noir, that complemented the darkness at the heart of the movie's narrative. Instead, the choice of color film stock for The Searchers seems to have been inspired by industry trends at the time—designed to improve flagging box-office receipts—rather than by strictly artistic criteria.

Ironically, audiences who had grown to love Ford's black-and-white movies set in Monument Valley reacted badly to his first color feature set there: She Wore a Yellow Ribbon (1949; cinematographer: Winton C. Hoch). The vibrant colors they were seeing in this movie and in The Searchers—the reds and browns of the earth, the constantly changing blues of the sky—accurately captured the appearance of Monument Valley in real life, but for viewers whose expectations were shaped by Ford's earlier movies, such as Stagecoach (1939), Monument Valley existed only in black and white. In color, The Searchers is magnificent; we can only guess at what it might have been in black and white.

**Black and White** Black-and-white movies are not pictures that lack color; for black and white (and the range in between) are colors. Contemporary movies with exceptionally good black-and-white cinematography include Good Night, and Good Luck (2005; director: George Clooney; cinematographer: Robert Elswit), the animated feature Persepolis (2007; directors: Marjane Satrapi and Vincent Paronnaud), Sin City (2005; directors: Frank Miller and Robert Rodriguez; cinematographer: Robert Rodriguez), Darren Aronofsky's Pi (1998; cinematographer: Matthew Libatique), Joel Coen's The Man Who Wasn't There (2001; cinematographer: Roger Deakins), and Dark Days (2000), a documentary directed and shot by Marc Singer. Although black-and-white film stock offers compositional possibilities and cinematographic effects that are impossible with color film stock, today it is used almost exclusively for nonprofessional productions. Because of its use in documentary films (before the 1960s) and in newspaper and magazine photographs (before the advent of color newspaper and magazine printing), we have ironically come to associate black-and-white photography and cinematography with a stronger sense of gritty realism than that provided by color film stock. But the distinct contrasts and hard edges of black-and-white cinematography can express an abstract world (that is, a world from which color has been abstracted or removed) perfectly suited for the kind of morality tales told in Westerns, film noirs, and gangster films. In fact, although many excellent color films have been made in these same genres—such as Roman Polanski's neo-noir Chinatown (1974; cinematographer: John A. Alonzo) or Quentin Tarantino's gangster film Pulp Fiction (1994; cinematographer: Andrzej Sekula)—we generally view their distinctive black-and-white predecessors as the templates for the genres.

Movies shot in black and white can also have moral or ethical implications. In theater throughout the ages, black-and-white costumes have been used to distinguish, respectively, between the "bad" and "good" characters. In the Western and film-noir genres, this has been a familiar pattern. In The Seventh Seal (1957; cinematographer: Gunnar Fischer), set in the Middle Ages, Swedish director Ingmar Bergman uses high-contrast black-and-white cinematography to articulate a conflict.
Black and white versus color  Stagecoach [1], made in 1939, was the first film that John Ford shot in Arizona's Monument Valley. Bert Glennon's black-and-white cinematography in Stagecoach provided a portrayal of the Old West that was different from Winton C. Hoch's depiction using color cinematography in The Searchers (1956) [2], one of the last films that Ford shot in Monument Valley. Although the expressive photography was state of the art in both films, the use of black and white and of color was not a matter of aesthetics but was dictated by industry standards.

between those who are devout Christians (dressed most often in white or gray costumes) and those nonbelievers who have only doubt and despair (dressed in black). But his color scheme goes beyond costuming to encompass distinct contrasts in lighting (both artificial and natural), settings (interior and exterior), and the chess pieces in a

Black and white in The Seventh Seal  In the climactic battle between the allegorical figure of Death (Bengt Ekerot, left) and Antonius Block, the Knight (Max von Sydow, right) in The Seventh Seal (1957; cinematographer: Gunnar Fischer), director Ingmar Bergman dresses both men in dark costumes but uses light and chess figures to distinguish between them [1]. Light from the upper left streams across the image, illuminating the Knight's blond-white hair, the Christian cross on his sword, and his chess pieces. There is just enough ambient light to outline the pale white face of the figure Death, shrouded in his hood. While this lighting and color strategy raises our expectations, we soon see that, in the chess game against Death, the Knight loses. The concluding shot [2] is one of the most iconic images in film history: Death leading the Knight and his squire, wife, and friends in a solemn dance of death. Again, notice Bergman's use of black and white: the dark-clad figures move upward on the mountain between the black earth and the white clouds. Death unites all.
climactic game in which the figure of Death (in a black cowl) plays with black pieces, while the Knight, who has returned from the Crusades to find his country ravaged by the Black Plague, plays with white pieces.

Tonality—the system of tones—is the distinguishing quality of black-and-white film stock. This system includes the complete range of tones from black to white. Anything on the set—furniture, furnishings, costumes, and makeup—registers in these tones. Even when a film is shot in black and white, it is customary to design its settings and costumes in color. Black-and-white cinematography achieves its distinctive look through such manipulation of the colors being photographed and through the lighting of them. During the height of the classical Hollywood studio system, set and costume designers worked in close collaboration with directors of photography to ensure that the colors used in their designs produced the optimal varieties of tones in black and white. Their goal was to ensure a balance of "warm" and "cold" tones to avoid a muddy blending of similar tones. Sometimes the colors chosen for optimal tonality on film were unattractive, even garish, on the set. Audiences were none the wiser, however, because they saw only the pleasing tonal contrasts in the final black-and-white movie.

Manipulation of tonal range makes black-and-white movies visually interesting, but that isn't all it does. For good or ill, tonality in black-and-white films often carries with it certain preconceived interpretations (e.g., black = evil, white = good). As simplistic, misleading, and potentially offensive as these interpretations may be, they reflect widespread cultural traditions that have been in effect for thousands of years. The earliest narrative films, which greatly appealed to immigrant audiences (most of whom could neither read nor speak English), often relied on such rough distinctions to establish the moral frameworks of their stories. Later, even though both audiences and cinematography became more

Tonal range This shot from Fred Zinnemann's High Noon (1952; cinematographer: Floyd Crosby) illustrates the tonal range possible in black-and-white cinematography: from absolute white (in the shirt), through a series of grays, to absolute black (in the bottom of the hat's brim). For the purposes of explanation, this illustration includes only six tones out of the complete range. Note that although he is the movie's protagonist, Marshal Will Kane (Gary Cooper) wears a black hat—typically, in less sophisticated morality tales, the symbolic mark of the bad guy.

Black-and-white tonality The opening scene of Alexander Mackendrick's Sweet Smell of Success (1957; cinematographer: James Wong Howe) takes place near midnight in Times Square, which is alive with activity. The thousands of incandescent and neon lights create a brash black-and-white environment in which the space lacks both depth and shadows. The people packed on the streets are members of a crowd, not individuals. In other movies, such bold blacks and whites might suggest the contrast of good and evil, but the lighting here gives no clue as to which is which.
sophisticated, these distinctions held together the narratives of countless films in diverse genres.

After tonality, the next thing we notice about black-and-white films is their use of, and emphasis on, texture and spatial depth within their images. The cinematographer can change the texture of an image by manipulating shadows and can control the depth of the image by manipulating lighting and lenses. The best-loved black-and-white movies employ such visual effects to underscore and enhance their stories. Looking at the work of cinematographer James Wong Howe on Alexander Mackendrick's *Sweet Smell of Success* (1957), for example, we are immediately struck by how his deft manipulation of tone, texture, and spatial depth have captured the sleazy allure of New York City's once notorious Times Square, and how the look of this movie is absolutely essential to its story of urban menace, corruption, and decay.

**Color** Although almost all movies today are shot in color, for nearly sixty years of cinema history color was an option that required much more labor, money, and artistic concession than black and white did. Color movies made prior to 1960 were typically elaborate productions, and the decisions to use color were made with the expectation from producers that the movies would justify the expense with impressive box-office returns. To gain a better understanding of the period prior to 1968, when color was not necessarily the default choice, let's take a moment to review briefly the history of color-film technology.

Although full-scale color production began only in the late 1930s, it was possible to create color images soon after the movies were invented, in 1895. The first methods were known as **additive color systems** because they added color to black-and-white film stock. These processes included hand-coloring, stenciling, tinting, and toning, but because they were so tedious, at first only selected frames were colored. Nonetheless, impressive achievements were made by such pioneers as Thomas A. Edison, Georges Méliès, Edwin S. Porter, and the filmmakers at Pathé Frères.

Hand-coloring involved the use of dyes applied directly by hand to the print to be projected, and stenciling, by contrast, was a complex, machine-driven process that enabled a film to use six different colors. However, the most common techniques were tinting and toning. Tinting consisted of dyeing the base of the film so that the light areas appeared in color; this technique provided shots or scenes in which a single color set the time of day, distinguished exterior from interior shots, created an emotional mood, or otherwise affected the viewer's perception. D. W. Griffith used this technique very effectively in such films as *Broken Blossoms* (1919; cinematographer: G. W. Bitzer), as did Robert Wiene in *The Cabinet of Dr. Caligari* (1920; cinematographer: Willy Hameister). Toning, a chemical process distinct from tinting, offered greater aesthetic and emotional control over the image by coloring the opaque parts of an image to a general color. Tinting and toning were often used together to extend the color of a single image.

As imaginative as these processes are, they do not begin to accurately reproduce the range of colors that exists in nature. Further experimentation with additive color processing resulted in a crude two-color additive process that used two complementary colors, usually red-orange and blue-green. Kinemacolor, an early process, used persistence of vision and a faster frame-per-second rate to simulate color in a lengthy documentary, *With Our King and Queen Through India* (1912). In 1915, the Technicolor Corporation introduced a similar two-color additive process, used effectively in aesthetic terms for the first time in Chester M. Franklin's *The Toll of the Sea* (1922; cinematographer: J. A. Ball), available on DVD, and a good example of the progress made to this point. This process was also used to photograph Albert Parker's impressive epic *The Black Pirate* (1926; cinematographer: Henry Sharp).

By the early 1930s, the additive process—with its technological difficulties and their economic consequences—had given way to a two-color **subtractive color system**, which was later refined to a three-color subtractive process introduced in 1932 for cartoons and 1934 for live-action features. The subsequent development of modern color cinematography is based on this subtractive system. How does it work in theory? Very basically, color results from the physical action of different light
waves on our eyes and optical nervous system, meaning that we perceive these different wavelengths of energy as different colors. Of these colors, three are primary—red, green, and blue; mixing them can produce all the other colors in the spectrum, and when added together they produce white. The subtractive process takes away unwanted colors from the white light. So when one of the additive primary colors (red, green, blue) has been removed from the spectrum on a single strip of film, what remains are the complementary colors (cyan, magenta, yellow). How does it work in practice? Technicolor works by simultaneously shooting three separate black-and-white negatives through three light filters, each representing a primary color. These three color-separation negatives are then superimposed and printed as a positive in natural color. Thus the final color results from the removal of certain color components from each of the three emulsion layers. The first films to be made with the subtractive process were Walt Disney's short "Silly Symphony" cartoons *Flowers and Trees* (1932) and *The Three Little Pigs* (1933)—both directed by Burt Gillett—and Pioneer Pictures' live-action film *La Cucaracha* (1934; director: Lloyd Corrigan). The first feature-length film made in the three-color subtractive process was Rouben Mamoulian's *Becky Sharp* (1935; cinematographer: Ray Rennahan).

Making a Technicolor movie was complicated, cumbersome, and cost almost 30 percent more than comparable black-and-white productions. The Technicolor camera, specially adapted to shoot three strips of film at one time, required a great deal of light. Its size and weight restricted its movements and potential use in exterior locations. Furthermore, the studios were obliged by contract to employ Technicolor's own makeup, which resisted melting under lights hotter than those used for shooting black-and-white films, and to process the film in Technicolor's labs, initially the only place that knew how to do this work.

For all these reasons, in addition to a decline in film attendance caused by the Great Depression, producers were at first reluctant to shoot in color. By 1937, however, color had entered mainstream Hollywood production; by 1939 it had proved itself much more than a gimmick in movies such as Victor Fleming's *Gone with the Wind* (cinematographer: Ernest Haller), *The Wizard of Oz* (cinematographer: Harold Rosson), and John Ford's *Drums along the Mohawk* (cinematographers: Bert Glennon and Ray Rennahan), all released that year.

In 1941, Technicolor introduced its Monopack—identical to Kodak's Kodachrome color-reversal film—a multilayered film stock that could be used in a conventional camera. Because the bulky three-strip camera was no longer necessary, Technicolor filming could now be done outdoors. Eventually, Kodak's rival Eastman Color system—a one-strip film stock that required less light, could be used in any standard camera, and could be processed at lower cost—replaced Technicolor. This single-strip process, developed by Kodak and used also by Fuji and Agfa, remained the standard color film stock in use until 2010, when Kodak ceased color film processing. But just as Hollywood took several years to convert from silent film to sound, so too the movie industry did not immediately replace black-and-white film with color. During the 1950s, Hollywood

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*Cinematographic Properties of the Shot* 235
used color film strategically, like the widescreen aspect ratio, to lure people away from their television sets and back into theaters. (See “Framing of the Shot,” pages 248–275.)

Now that color film dominates, a new naturalism has become the cinematographic norm, where what we see on the screen looks very much like what we would see in real life. By itself, however, color film stock doesn’t necessarily produce a naturalistic image. Film artists and technicians can manipulate the colors in a film as completely as they can any other formal element. Ultimately, just like its black-and-white counterpart, color film can capture realistic, surrealistic, imaginary, or expressionistic images.

Much of Stanley Kubrick’s Barry Lyndon (1975; cinematographer: John Alcott), for example, employs a color palette that reflects its temporal setting very well; it’s the world of soft pastels and gentle shadows depicted in the paintings of such eighteenth- and nineteenth-century artists as Thomas Gainsborough, William Hogarth, and Adolph von Menzel. However, this palette wasn’t achieved merely by pointing the camera in a certain direction and accurately recording the colors found there. Instead, the filmmakers specifically manipulated the images through careful planning art direction, and technical know-how to render the naturally occurring colors in more subtle and “painterly” shades.

In a different vein, the interplay of fantasy and reality is brilliantly and vibrantly conveyed in Federico Fellini’s first color film, Juliet of the Spirits (1965; cinematographer: Gianni Di Venanzo), through the use of a rich, varied, and sometimes surreal palette. To underscore the movie’s theme, Fellini and Di Venanzo often interrupt seemingly naturalistic scenes with bursts of intense and dreamlike color. The effect is disorienting but magical, much like dreams themselves.

**Lighting**

During preproduction, most designers include an idea of the lighting in their sketches, but in actual production, the cinematographer determines the lighting once the camera setups are chosen. Ideally,
the lighting shapes the way the movie looks and helps tell the story. As a key component of composition, lighting creates our sense of cinematic space by illuminating people and things, creating highlights and shadows, and defining shapes and textures. Among its properties are its source, quality, direction, and style.

**Source** There are two sources of light: natural and artificial. Daylight is the most convenient and economical source, and in fact the movie industry made Hollywood the center of American movie production in part because of its almost constant sunshine. Even when movies are shot outdoors on clear, sunny days, however, filmmakers use reflectors and artificial lights because they cannot count on nature’s cooperation. And even if nature does provide the right amount of natural light at the right time, that light may need to be controlled in various ways, as the accompanying photograph of reflector boards being used in the filming of John Ford’s *My Darling Clementine* (1946) shows.

Artificial lights are called *instruments* to distinguish them from the light they produce. Among the many kinds of these instruments, the two most basic are *focusable spotlights* and *floodlights*, which produce, respectively, hard (mirrorlike) and soft (diffuse) light. A focusable spotlight can produce either a hard, direct spotlight beam or a more indirect beam. When it is equipped with black metal doors (known as *barn doors*), it can be used to cut and shape the light in a variety of ways. In either case, it produces distinct shadows. Floodlights produce diffuse, indirect light with very few to no shadows. The most effective floodlight for

**Reflectors** Many scenes of John Ford’s *My Darling Clementine* (1946; cinematographer: Joe MacDonald) were shot in the sunny desert terrain of Monument Valley in Arizona and Utah. But as this photo shows, a large bank of reflector boards was used when the sunshine was insufficient or when the director wanted to control the lighting.

**Suggestive use of lighting** In Billy Wilder’s comedy *Some Like It Hot* (1959; cinematographer: Charles Lang, Jr.), the beam from a spotlight suggestively doubles as a virtual neckline for Marilyn Monroe during her famous performance of “I Wanna Be Loved by You.” As he often did during his long career as a screenwriter and director, Wilder was playfully testing the boundaries of Hollywood moviemaking—seeing what he could get away with.
Softening shadows

Outdoor shots in direct sunlight pose a risk of casting harsh shadows on actors’ faces. This shot from James Cameron’s *Titanic* (1997; cinematographer: Russell Carpenter) shows the effect of using a reflector board to soften shadows and to cast diffuse light on the bottom of the chin and the nose and under the brow, thus giving Leonardo DiCaprio’s face a softer, warmer look on-screen.

Filmmaking is the softlight, which creates a very soft, diffuse, almost shadowless light.

Another piece of lighting equipment, the reflector board, is not really a lighting instrument because it does not rely on bulbs to produce illumination. Essentially, it is a double-sided board that pivots in a U-shaped holder. One side is a hard, smooth surface that reflects hard light; the other is a soft, textured surface that provides a softer fill light. Reflector boards come in many sizes and are used frequently, both in interior and especially in exterior shooting; most often they are used to reflect sunlight into shadows during outdoor shooting.

**Quality**

The quality of light on a character or situation is a very important element in helping a movie tell its story. Quality refers to whether the light is hard (shining directly on the subject, creating crisp details and a defined border and high contrast between illumination and shadow) or soft (diffused so that light hits the subject from many slightly varying directions, softening details, blurring the line between illumination and shadow, and thus decreasing contrast). We can generally (but not always) associate hard, high-contrast lighting featuring deep shadows (known as low-key lighting) with serious or tragic stories and soft, even lighting (high-key lighting) with romantic or comic stories.

The way the cinematographer lights and shoots an actor invariably suggests an impression of the character to the audience. A good example of how the quality of lighting can affect how we look at and interpret characters in a scene can be found in Orson Welles’s *Citizen Kane* (1941; cinematographer: Gregg Toland). When Kane (Welles) first meets and woos Susan Alexander (Dorothy Comingore), the light thrown on their respective faces during close-up shots reveals an important distinction between them. Susan’s face, lit with a soft light that blurs the border between illumination and shadow, appears youthful and naive. In contrast, Kane’s face is lit with a hard and crisp light, making him appear older and more worldly.

**Direction**

Light can be thrown onto a movie actor or setting (exterior or interior) from virtually any direction: front, side, back, below, or above. By direction, we also mean the angle of that throw, for the angle helps produce the contrasts and shadows that suggest the location of the scene, its mood, and the time of day. As with the other properties of lighting, the direction of the lighting must be planned ahead of time by the cinematographer in cooperation with the art director so that the lighting setup achieves effects that complement the director’s overall vision.

The effects possible with any one lighting setup are extensive, but not limitless. If anything, the pioneering work of one cinematographer may make such an impression on moviegoers and filmmakers alike that it limits the freedom of subsequent filmmakers to use the same lighting setup in different ways. In other words, as with most other aspects of filmmaking, lighting is subject to conventions. Perhaps the best-known lighting convention in feature filmmaking is the three-point system. Employed extensively during the Hollywood studio era (1927-47), the three-point system was used to cast a glamorous light on the studios’ most valuable assets during these years—their stars—and it remains the standard by which movies are lit today.

The three-point system employs three sources of light, each aimed from a different direction and position in relation to the subject: key light, fill light, and backlight. The backlight is the least
Lighting and setting  A good way to understand the importance of how lighting influences our impressions of the setting is to compare the quality of two movies that were filmed in the same setting. Both Alexander Mackendrick’s *Sweet Smell of Success* (1957; cinematographer: James Wong Howe) and Woody Allen’s *Manhattan* (1979; cinematographer: Gordon Willis) use the Queensboro Bridge (or 59th Street Bridge, made famous in Simon and Garfunkel’s song of the same name) for a key scene. Both scenes are shot at night in the environs of the bridge.

[1] This scene from *Sweet Smell of Success* takes place outside a nightclub located on a street that runs alongside and below the bridge. In this image, Sidney Falco, the unscrupulous assistant to J. J. Hunsecker, the city’s most powerful gossip columnist, has just planted drugs in the coat of Steve Dallas, an innocent jazz guitarist who wants to marry Hunsecker’s sister, Susan. We see Falco (Tony Curtis, *left*) confirming the setup with NYPD Lieutenant Harry Kello (Emile Meyer, *right*) and one of his assistants (unidentified actor, *center*). Hunsecker has ordered Falco, as well as Kello, whom he controls, to make Dallas the victim of this scheme to keep the musician from marrying his sister. Shadows are deep, and the streetlights cast sharp pools of light on streets wet with rain. This atmosphere is made even more menacing by the noisy sounds of the bridge traffic overhead.

[2] In *Manhattan*, two of the typically self-deprecating New Yorkers that populate Allen’s movies—Isaac Davis (Woody Allen) and Mary Wilkie (Diane Keaton)—meet for the second time at a cocktail party, desert their dates and leave together, and take a joyous walk through the streets, which ends on a bench in Sutton Square, a quiet, elegant neighborhood a few blocks closer to the river than the site of the scene in image [1], but close enough that this scene is also set alongside and below the bridge. The world of *Sweet Smell of Success* could be a million miles away. The bridge stretches above the two characters and across the frame, its supporting cables twinkling with lights, the early morning sky soft and misty behind. The only sounds are the lovers’ voices and George and Ira Gershwin’s romantic ballad “Someone to Watch over Me.” Woody Allen is no starry-eyed fool, but the *Manhattan* in this movie is all romance, soft lights, and human relationships that (mostly) end happily.

***Soft versus hard lighting***  Gregg Toland’s use of lighting in *Citizen Kane* (1941) creates a clear contrast between Charles Foster Kane (Orson Welles) [1] and Susan Alexander (Dorothy Comingore) [2] that signals important differences between them in age (Kane is 45; Alexander is 22) and experience.
Three-point lighting  In the history of over-the-top mise-en-scène, few directors surpass Josef von Sternberg. The Scarlet Empress (1934; cinematographer: Bert Glennon), a ravishing, high-camp historical drama, is also the director’s visual tribute to the allure of Marlene Dietrich, who plays Russian empress Catherine the Great. Von Sternberg consistently photographs her with three-point lighting that accentuates her exquisite beauty. In this example, notice how the key light, positioned to the side and slightly below the actor, casts deep shadows around her eyes and on her right cheek; the fill light, which is positioned at the opposite side of the camera from the key light, softens the depth of the shadows created by the brighter key light; and the backlight (a von Sternberg trademark in lighting Dietrich), which is positioned behind and above, lighting both sides of the actor, not only creates highlights along the edges of her hair but also separates her from the background and thus increases the appearance of three-dimensionality in the image.

essential of these three sources. The overall character of the image is determined mainly by the relationship between the key and fill lights. The key light (also known as the main, or source, light) is the primary source of illumination and therefore is customarily set first. Positioned to one side of the camera, it creates hard shadows. The fill light, which is positioned at the opposite side of the camera from the key light, adjusts the depth of the shadows created by the brighter key light. Fill light may also come from a reflector.

The primary advantage of three-point lighting is that it permits the cinematographer to adjust the relationship and balance between illumination and shadow—the balance between the key and fill lights—a balance known as the lighting ratio. When little or no fill light is used, the ratio between bright illumination and deep shadow is very high; the effect produced is known as low-key lighting. Low-key lighting produces the overall gloomy atmosphere that we see in horror films, mysteries, psychological dramas, crime stories, and film noirs, where its contrasts between light and dark often imply ethical judgments.

High-key lighting  George Lucas’s use in THX 1138 (1971; cinematographers: Albert Kihn and David Myers) of an austere setting and intense white lighting that creates a shadowless environment is as chilling as the futuristic society it records. This society has outlawed sexual relations and controls inhabitants with a regimen of mind-changing drugs. Those who rebel are thrown into a prison that is a vast, white void.

High-key lighting, which produces an image with very little contrast between the darks and the
lights, is used extensively in dramas, musicals, comedies, and adventure films; its even, flat illumination does not call particular attention to the subject being photographed. When the intensity of the fill light equals that of the key light, the result will be the highest of high-key lighting: no shadows at all.

You may have noticed that these terms—*low-key lighting* and *high-key lighting*—are counterintuitive: we increase the contrasts to produce low-key lighting and decrease them to produce high-key lighting. The cinematographer dims the fill light to achieve a higher ratio and contrast between shadow depth and illumination, and intensifies the fill light to lower the ratio and contrast.

The third source in three-point lighting is the **backlight**, usually positioned behind and above the subject and the camera and used to create highlights along the edges of the subject as a means of separating it from the background and increasing its appearance of three-dimensionality (such highlights are also known as *edge lights* or *rim lights*). In exterior shooting, the sun is often used as a backlight. Although it is less important to the three-point system than key light and fill light, backlight can be used on its own to achieve very expressive effects. One effect is to create depth in a shot by separating a figure from the background, as in the projection-room scene in Orson Welles's *Citizen Kane* (1941; cinematographer: Gregg Toland), in which Mr. Rawlston (Philip Van Zandt) and Jerry Thompson (William Alland) are outlined by the strong backlight from the projector.

Lighting from underneath a character (sometimes called *Halloween lighting*) creates eerie, ominous shadows on the actor's face by reversing the normal placement of illumination and shadow. This sort of lighting is especially appropriate in the horror genre, as in James Whale's *Bride of Frankenstein* (1935; cinematographer: John J. Mescall), in which the lighting thrown on Dr. Pretorius (Ernest Thesiger) from below accentuates the diabolical nature of his scientific ambitions.

Lighting thrown on a character from above can be used for many different effects, but a common result is to make a character appear vulnerable, or—in the example from Francis Ford Coppola's...
Lighting from above  In the opening scene of Francis Ford Coppola's *The Godfather* (1972; cinematographer: Gordon Willis)—the wedding reception of his daughter Connie—Don Vito Corleone (Marlon Brando) responds to a request from one of the guests, Signore Bonasera, an undertaker, who asks Corleone to arrange the murder of two men who beat his daughter. Don Corleone listens impassively as lighting from above puts his eyes in deep shadow, emphasizing his power and mystique. He at first gently rebukes Bonasera for not paying him respect in the preceding years, but because it is traditional to grant requests on a daughter's wedding day, he finally grants the favor. Bonasera understands the magnitude of his debt and that he will one day be called upon to repay the favor.

*The Godfather* (1972; cinematographer: Gordon Willis) shown in the accompanying photo—threatening and mysterious.

**Color**  Color is another property of light. Perhaps its most important technical aspect is color temperature, a characteristic of visible light that is important in cinematography. Any light source will emit various light rays from the color spectrum. The absolute temperature of these rays is registered on the Kelvin scale, a measure of the color quality of the light source. The movie camera does not see color the way the human eye does and thus sometimes seems to exaggerate colors. We may see an object as white, but it may turn out to look very blue or orange on the screen. Understanding the temperature of a color enables a cinematographer during shooting (or laboratory technicians in the post-production phase) to correct the color and achieve the desired look. One way to balance color is to match the sensitivity of the film stock to the color temperature of the light source. Another way is through the use of a camera filter, an optical element (usually a transparent sheet of colored glass or gelatin) placed in front of the lens that alters the light by cutting out distinct portions of the color spectrum as it passes to be registered on the film stock.

The overall style of a film is determined by its **production values**, or the amount and quality of human and physical resources devoted to the image. This includes specific decisions regarding the various properties of light we have just discussed. During the height of the classical Hollywood studio era, studios distinguished themselves from each other by adopting distinctive lighting styles and production values: for example, somber, low-key lighting in black-and-white pictures from Warner Bros.; sharp, glossy lighting in the films from 20th Century Fox; and bright, glamorous lighting for MGM's many color films, especially the musicals. The studios cultivated (and in many cases enforced) their distinct styles with an eye to establishing brand identities, and the filmmakers working for them were expected to work within the limits of the company style.

Cinematographers working within the constraints of a well-established genre often find that their decisions about lighting style are at least partly determined by the production values and lighting styles of previous films in that genre. Film Noir lighting, for example, conventionally uses high-contrast white-and-black tones to symbolize the opposing forces of good and evil. The very name *film noir* (noir means “black” in French) implies that lighting style is an important aspect of the genre. Filmmakers working within a genre with well-established conventions of lighting must at least be aware of those conventions.

Of course, the lighting conventions that define a genre can be altered by daring and imaginative filmmakers. For example, cinematographer John Alton deviates from the film-noir lighting formula in Anthony Mann's *T-Men* (1947) in order to develop a sense of moral ambiguity rather than a hard-edged distinction between good (light) and evil.
Aspects of lighting in *Dogville* (1) Grace (Nicole Kidman) provokes Jack. (2) Grace faces the sunlight. (3) Grace, in profile, is transfixed by the sunlight.

(darkness). A hard-edged crime story about U.S. Treasury Department agents’ successful busting of a counterfeit ring, *T-Men* incorporates many shots made in near-total darkness—a black so deep that sometimes you can barely see the action. Bright lighting occasionally punctuates this gloom, but the overall tendency is to place everyone—cops and counterfeiters alike—in a dark and murky atmosphere. Alton lit his sets for mood rather than for making them completely visible to the viewer, and with this approach he rewrote the textbook on film-noir lighting. In doing this, he also changed the expectations traditionally raised by film-noir lighting in order to direct and complicate our interpretation of the film’s narrative.

The various aspects of lighting—its source, quality, direction, and color—work together with other elements to determine the overall mood and meaning of a scene. Lars von Trier’s *Dogville* (2003; cinematographer: Anthony Dod Mantle), a misanthropic vision of the United States in the Depression-era 1930s, is set in a town of the same name that is located high on a plateau and populated by selfish, bored losers and miscreants. Grace (Nicole Kidman) arrives out of nowhere as a “gift” to the town’s residents, whose primary reactions to her presence involve humiliating and torturing her, even as she does their chores to seek their acceptance. What is this place? Who is Grace? Why is she treated as an outsider? Lighting helps us answer these questions. The town’s setting is a schematic design constructed on a vast, dark studio floor and often photographed from a very high angle that permits us to see its entire layout and total isolation from the surrounding countryside (which we never see). However, in contrast to the high-key lighting that floods the overall set with an even light, the scene we are considering (which takes place in one of the “houses” outlined on the floor) uses expressively lit close-ups to record a turning point in the action.
Grace is frustrated by her lot in life and tries to provoke Jack McKay (Ben Gazzara) into taking a more open view of the world, which is ironic, since he is blind. We are in McKay’s residence, where the window is heavily draped to emphasize his condition. The scene opens with Grace sitting in a chair as she taunts Jack, telling him that she’s walked outside and noticed the windows: “It must be a wonderful view.” The lighting that illuminates her is a classic example of three-point lighting (image [1] on page 243): Grace is on the right side of the frame, in semiprofile; the light is falling on her from no identifiable source, highlighting her left cheek and the ridge of her nose; her heavily made-up eyes are in the shadows of her bangs. From this lighting, we clearly see that she is determined to get somewhere with her provocation; in addition to encouraging Jack to “see” more of the world, she may also be making sexual overtures toward him.

Next, Grace boldly takes the liberty of pulling open the drapes. Standing with her back toward us and holding the drapes apart with her widespread arms, she faces bright, almost surreal, sunlight and trees (significantly, there is little other greenery in the town) as the background music builds in a soft crescendo that suggests both spiritual and sexual release [2]. The reflection of her brightly lit face in the window accentuates the passage from darkness to light. She then turns, transfixed by the light: her profile, in the far right of the frame, faces directly left and toward the sunlight, which is evenly thrown onto her face; her lips are open in an ecstatic expression; the remaining two-thirds of the screen is dark [3]. Finally, she turns toward Jack, the bright sunlight behind her (an excellent example of backlighting), her face now in shadows, but her parted lips continue to underscore her sense of astonishment at how easy it was to bring light into darkness—a microcosm of her larger hope of achieving acceptance in Dogville [4]. As the scene ends, Jack remains trapped in his blindness. It is Grace, not Jack, who is able to see the light.

Lenses
In its most basic form, a camera lens is a piece of curved, polished glass or other transparent material. As the “eye” of the camera, its primary function is to bring the light that emanates from the subjects in front of the camera (actors, objects, or settings) into a focused image on the film, tape, or other sensor inside the camera. This was as true of the lens in the fifteenth-century camera obscura (in which the sensor was the wall on which the image was seen) as it is of the lenses of today.

The basic properties shared by all lenses are aperture, focal length, and depth of field. The aperture of a lens is usually an adjustable iris (or diaphragm) that limits the amount of light passing through a lens. The greater the size of the aperture, the more light it admits through the lens. The focal length of the lens is the distance (measured in millimeters) from the optical center of the lens to the focal point on the film stock or other sensor when the image is sharp and clear (in focus). Focal length affects how we perceive perspective—the appearance of depth—in a shot, and it also influences our perception of the size, scale, and movement of the subject being shot. The four major types of lenses are designated by their respective focal lengths:

1. The short-focal-length lens (also known as the wide-angle lens, starting as low as 12.5mm) produces wide-angle views. It makes the subjects on the screen appear

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Looking at Movies
Focal Length
This tutorial reviews the effects created by lenses of different focal lengths.
Short-focal-length lens  This shot from Stanley Kubrick’s *Dr. Strangelove* (1964; cinematographer: Gilbert Taylor) comically reinforces our sense of the powerlessness of Group Captain Lionel Mandrake (Peter Sellers, facing the camera) as he meets with his superior officer, Brigadier General Jack D. Ripper (Sterling Hayden). The resulting wide-angle composition makes Mandrake look almost like a toy doll standing on the powerful general’s desk.

Long-focal-length lens  This image from Stanley Kubrick’s *Barry Lyndon* (1975; cinematographer: John Alcott) shows the flattening effect of a long-focal-length lens. The marching soldiers’ forward progress seems more gradual as a result.

Middle-focal-length lens  This shot from Billy Wilder’s *Sunset Boulevard* (1950; cinematographer: John F. Seitz) includes the movie’s three principal characters (from left to right): Max von Mayerling (Erich von Stroheim), with his back to us in the near left foreground; Norma Desmond (Gloria Swanson); and Joe Gillis (William Holden), in the middle ground facing us. A small orchestra is in the background. The middle-focal-length lens used to make this shot keeps the three principal subjects in normal focus, and the overall image corresponds to our day-to-day experience of depth and perspective.

2. The long-focal-length lens (also known as the telephoto lens; focal lengths ranging from 85mm to as high as 500mm) brings distant objects close, makes subjects look closer together than they do in real life, and flattens space and depth in the process. Thus, it alters the subject’s movement, so that a subject moving from the background toward the camera might appear to be barely moving at all.

3. Although the short and long extremes are used occasionally to achieve certain visual effects, most shots in feature films are made with a middle-focal-length lens—from 35mm to 50mm—often called the normal lens. Lenses in this range create images that correspond to our day-to-day experience of depth and perspective.

4. The zoom lens—also called the variable-focal-length lens—permits the cinematographer to shrink or increase the focal length farther apart than they actually are, and because this lens elongates depth, characters or objects moving at a normal speed from background to foreground through this stretched depth might appear to be moving faster than they actually are.
in a continuous motion and thus simulates the effect of movement of the camera toward or away from the subject. However, it does not actually move through space but simply magnifies the image.

Short-focal-length, long-focal-length, and middle-focal-length lenses all have fixed focal lengths and are known as **prime lenses**, but zoom lenses are in their own category. Both prime and zoom lenses have their specific optical qualities, and because they are thought to produce sharper images, prime lenses are generally used more than zoom lenses. In the hands of an accomplished cinematographer, the zoom lens can produce striking effects, but when it is used indiscriminately, as it often is by less skilled filmmakers, it not only feels artificial to an audience but can unintentionally disorient viewers. As with all other aspects of cinematography, the lens used must be appropriate for the story being told.

**Depth of field** is a property of the lens that permits the cinematographer to decide what **planes**, or areas of the image, will be in focus. As a result, depth of field helps create emphasis either on one or more selected planes or figures or on the whole image. The term **depth of field** refers to the distances in front of a camera and its lens in which the subjects are in apparent sharp focus. The short-focal-length lens offers a nearly complete depth of field, rendering almost all objects in the frame in focus. The depth of field of the long-focal-length lens is generally a very narrow range, and it leaves the background and foreground of the in-focus objects dramatically out of focus. In the middle-focal-length lens, the depth of field keeps all subjects in a “normal” sense of focus.

In virtually all shooting, cinematographers keep the main subject of each shot in sharp focus to maintain clear spatial and perspectival relations within frames. One option available to cinematographers, however, is a **rack focus** (also known as **select focus**, **shift focus**, or **pull focus**) — a change of the point of focus from one subject to another. This technique guides our attention to a new clearly focused point of interest while blurring the previous subject in the frame (see the illustration on page 247).

**Zoom lens.** In making The Hurt Locker (2008; cinematographer: Barry Ackroyd), director Kathryn Bigelow wanted viewers to experience the Iraq war as if they were virtually involved in it. Thus, she had her camera team use lightweight Super 16mm cameras that gave them the mobility and flexibility to enter into the action and take viewers with them. One of these cameras was fitted with a zoom lens to allow its operator multiple perspectives on a scene within one shot. Overall, the movie is concerned with the highly dangerous work of a team that identifies and disables enemy roadside bombs and similar incendiary weapons. Here, the team, learning that a UN facility is apparently in danger of some kind of attack, orders the immediate evacuation of people from the building. In this shot, the camera lens begins with an extreme long shot [1] and then immediately shifts to a shorter focal length to put us among the coalition soldiers leading the frightened workers to safety [2]. The rapid, fluid movement of the lens between a neutral observation point and the people rushing toward the camera increases our involvement with the military forces and workers. In subsequent zoom lens shots, we see the weapons team make surveillance of the immediate area, shoot a suspicious man, and disarm a vehicle loaded with bombs, thus preventing an explosion.
Rack focus. In this shot from Guillermo del Toro's The Devil's Backbone (2001; cinematographer: Guillermo Navarro), the camera uses depth of field to guide our attention from one subject to another. When the shot begins, the lens is focused on the background where the villainous Jacinto (Eduardo Noriega) scans the orphanage courtyard for stray witnesses [1]. The lens then shifts focus to the foreground so that Jacinto's elusive prey, the orphan Jamie (Iñigo Garcés), snaps into sharp relief [2].

<table>
<thead>
<tr>
<th>Type of Lens</th>
<th>Characteristics of Images Produced by Aperture, Focal Length, and Depth of Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime lenses</td>
<td></td>
</tr>
<tr>
<td>Short-focal-length lens</td>
<td>- Produces wide-angle views.</td>
</tr>
<tr>
<td>(wide-angle lens)</td>
<td>- Makes subjects appear farther apart than they actually are.</td>
</tr>
<tr>
<td>Long-focal-length lens</td>
<td>- Produces deep-angle views.</td>
</tr>
<tr>
<td>(telephoto lens)</td>
<td>- Brings distant objects close.</td>
</tr>
<tr>
<td>Middle-focal-length lens</td>
<td>- Flattens space and depth.</td>
</tr>
<tr>
<td>(normal lens)</td>
<td>- Makes subjects look closer together than they actually are.</td>
</tr>
<tr>
<td></td>
<td>- Narrow depth of field leaves most of the background and foreground of the in-focus objects dramatically out of focus.</td>
</tr>
<tr>
<td>Zoom lens</td>
<td></td>
</tr>
<tr>
<td>Zoom lens</td>
<td>- Produces images that simulate the effect of movement of the camera toward or away from the subject.</td>
</tr>
<tr>
<td>(variable-focal-length lens)</td>
<td>- Rather than actually moving through space, merely magnifies the image.</td>
</tr>
<tr>
<td></td>
<td>- Can make a shot seem artificial to an audience.</td>
</tr>
</tbody>
</table>
The images you see on the screen are produced by a complex interaction of optical properties associated with the camera lens. Table 6.1 provides a ready reference on how the different lenses discussed here produce different images.

**Framing of the Shot**

Framing is the process by which the cinematographer determines what will appear within the borders of the image during a shot. Framing turns the comparatively infinite sight of the human eye into a finite movie image—an unlimited view into a limited view. This process requires decisions about each of the following elements: the proximity to the camera of main subjects, the depth of the composition, camera angle and height, the scale of various objects in relation to each other, and the type of camera movement, if any.

At least one decision about framing is out of the cinematographer's hands. Although a painter can choose any size or shape of canvas as the area in which to create a picture—large or small, square or rectangular, oval or round, flat or three-dimensional—cinematographers find that their choices for a "canvas" are limited to a small number of dimensional variations on a rectangle. This rectangle results from the historical development of photographic technology. Nothing absolutely dictates that our experience of moving images must occur within a rectangle; however, because of the standardization of equipment and technology within the motion-picture industry, we have come to know this rectangle as the shape of movies.

The relationship between the frame's two dimensions is known as its aspect ratio (Fig. 6.2), the ratio of the width of the image to its height. Each movie is made to be shown in one aspect ratio from beginning to end. The most common aspect ratios are

- 1.33:1 Academy (35mm flat)
- 1.66:1 European widescreen (35mm flat)
- 1.85:1 American widescreen (35mm flat)
- 2.2:1 Super Panavision and Todd-AO (70mm flat)
- 2.35:1 Panavision and CinemaScope (35mm anamorphic)
- 2.75:1 Ultra Panavision (70mm anamorphic)

Feature-length widescreen movies were made as early as 1927—the most notable being Abel Gance's spectacular *Napoleon* (1927)—and in Hollywood, the Fox Grandeur 70mm process very effectively enhanced the epic composition and sweep of Raoul Walsh's *The Big Trail* (1930; cinematographer: Arthur Edeson). Until the 1950s, when the widescreen image became popular, the standard aspect ratio for a flat film was the Academy ratio of 1.33:1, meaning that the frame is 33 percent wider than it is high—a ratio corresponding to the dimensions of a single frame of 35mm film stock. Today's more familiar widescreen variations provide wider horizontal and shorter vertical dimensions. Most commercial releases are shown in the 1.85:1 aspect ratio, which is almost twice as wide as it is high. Other widescreen variations include a 2.2:1 or 2.35:1 ratio when projected.

Architectural elements—such as arches, doorways, and windows—are frequently used to mask a frame. A person placed between the camera and its subject can also mask the frame, as in the opening of John Ford's *The Searchers* (see page 362). In Mike Nichols's *The Graduate* (1967; cinematographer: Robert Surtees), during her initial seduction scene of Ben Braddock (Dustin Hoffman), Mrs. Robinson (Anne Bancroft) sits at the bar in her house and raises one leg onto the stool next to her, forming a triangle through which Ben is framed or, perhaps, trapped. Despite these modest attempts to break up the rectangular movie frame into other shapes through frames within the frame, movies continue to come to us as four-sided images that are wider than they are tall.

**Implied Proximity to the Camera**

From our earlier discussion of mise-en-scène (see Chapter 5), we know that in the vast majority of movies, everything we see on the screen—including

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*In shooting for television broadcast, cinematographers are increasingly using the 1.78:1 aspect ratio, which can be seen on a home TV set with a format of 16:9, universal for HDTV.*
FIGURE 6.2 Basic Aspect Ratios

Subjects within a shot and their implied proximity to each other—has been placed there to develop the narrative's outcome and meaning. Our interpretations of these on-screen spatial relationships happen as unconsciously and automatically as they do in everyday life.

To get a sense of the importance of proximity, imagine yourself on a crowded dance floor at a club or party. Among all the other distracting things in your field of vision, you see an attractive person looking at you from the opposite end of the room. You may assign that person some significance from that distance, but if that same person walks up to you, virtually filling your field of vision, then the person suddenly has much greater significance to you and may provoke a much more profound reaction from...
Architectural mask in The Book of Eli In this image, the Denzel Washington character is isolated in an architectural mask formed by an opening under a destroyed highway in Albert and Allen Hughes's sci-fi thriller The Book of Eli (2010), a movie that contains several other excellent examples of this technique.

you. Regardless of the outcome of this encounter, you have become visually involved with this person in a way that you wouldn't have if the person had remained at the other end of the room.

Similarly, the implied proximity of the camera to the subjects being shot influences our emotional involvement with those subjects. Think of how attentive you are during a close-up of your favorite movie actor or how shocked you feel when, as in Gore Verbinski's horror movie The Ring (2002; cinematographer: Bojan Bazelli), an actor moves quickly and threateningly from a position of obscurity in the background to a position of vivid and terrifying dominance of the frame. We all have favorite scenes from horror films that have shocked us in this way, violating and then virtually erasing the distance between us and the screen.

Of course, nearness is not the only degree of proximity that engages our emotions. Each of the possible arrangements of subjects in proximity to each other and to the camera has the potential to convey something meaningful about the subjects on-screen, and thankfully, most of those meanings come to us naturally.

Shot types The names of the most commonly used shots employed in a movie—extreme long shot, long shot, medium long shot, medium shot, medium close-up, close-up, and extreme close-up—refer to the implied distance between the camera lens and the subject being photographed. Since the best way to remember and recognize the different types of shots is to think in terms of the scale of the human
body within the frame, we'll describe them in terms of that scale. The illustrations are from Tom Hooper's *The King's Speech* (2010; cinematographer: Danny Cohen). Historically, the story is familiar: King George V dies in 1936, and his son David accedes to the throne as Edward VIII; but his romantic relationship with and desire to marry Wallis Simpson, a twice-divorced American, leads to his abdication and the accession of his brother Albert ("Bertie"), the Duke of York, to the throne as George VI. The psychological and emotional effects of his royal upbringing add depth to the story. As a boy, Bertie developed a serious stammer due to the apparent bullying of his father and was therefore unprepared to handle the speaking engagements required of the king, both in person and over the radio. With the encouragement of his wife, he meets a relatively unknown speech therapist, Lionel Logue, who uses a series of experimental vocal, physical, emotional, and psychological techniques that eventually make it possible for the future king to speak fluently and confidently in public.

- In the **extreme long shot** (ELS or XLS), typically photographed at a great distance, the subject is often a wide view of a location, which usually includes general background information. When used to provide such an informative context, the XLS is also an **establishing shot**. Even when human beings are included in such a shot, the emphasis is not on them as individuals but on their relationship to the surroundings. Image [1] shows Sandringham House, an immense country house used by the British royal family. Although there are several people on the terrace, the function of the shot is to identify the house and its grandeur.

- The **long shot** (LS) generally contains the full body of one or more characters (almost filling the frame, but with some of the surrounding area above, below, and to the sides of the frame also visible). In image [2], the archbishop and other officials of Westminster Abbey, standing amid the abbey's splendid surroundings, discuss the preparation for the inauguration of King George VI.

- A **medium long shot** (MLS) is neither a medium shot nor a long shot, but one in between. It is used to photograph one or more characters, usually from the knees up, as well as some of the background. This indispensable shot permits the director to place two characters in conversation and to shoot them from a variety of angles, as in image [3], where we see a meeting between the future king (Colin Firth, *left*) and his speech therapist, Lionel Logue (Geoffrey Rush, *right*), in Logue's studio. Because of the wide use of the MLS in Hollywood movies, the French call this shot the *plan Américain* (American shot).

- The **medium shot** (MS), somewhere between the long shot and the close-up, usually shows a character from the waist up. The MS is the most frequently used type of shot because it replicates our human experience of proximity without intimacy; it provides more detail of the body than the LS does. Unlike the close-up, the MS can include several characters, but it reveals more nuance in the characters' faces than can be captured in the MLS. Image [4] is a typical medium shot of Mrs. Wallis Simpson (Eve Best) greeting the duke.
and duchess of York at a cocktail party at a royal country house. Because she is not a member of the royal family, she is not officially entitled to take the role of host; nonetheless, her face registers her self-confidence.

- In a close-up (CU), the camera pays very close attention to the subject, whether it is an object or a person, but it is most often used in close-ups of actors’ faces. Although it traditionally shows the full head (sometimes including the shoulders), it can also be used to show another part of the body, such as a hand, eye, or mouth. When focused on a face, the CU can provide an exclusive view of the character’s emotions or state of mind, yet it can also show a face lacking emotion or thought. In image [5] we see George VI successfully deliver a radio speech in September 1939 informing the nation that Great Britain has declared war on Germany. It is, for him, a moment of personal and professional triumph, won through his evident determination and the efforts of his mentor.
- The medium close-up (MCU) shows a character from approximately the middle of the chest to the top of the head. It provides a view of the face that catches minor changes in expression and provides some detail about the character’s posture. Image [6] portrays speech therapist Lionel Logue as he begins his sessions with the future king of England.
- An extreme close-up (XCU or ECU), a powerful variation on the CU, is produced when the camera records a very small detail of the subject. Comparing images [5] and [7], you can see that focusing on the future king’s mouth and his aggressive repetition of the word “father” show how eager he is to break the psychological hold his father maintains on him.
- Note: you can more accurately label various shots according to the number of people in them. As is obvious, a two-shot contains two characters, a three-shot, three characters, and a group shot, more than three people.

Depth

Because the image of the movie screen is two-dimensional and thus appears flat (except for movies shot with 3-D cinematography), one of the most compelling challenges faced by cinematographers has been how to give that image an illusion of depth. From the earliest years of film history, filmmakers have experimented with achieving different illusions of depth. D. W. Griffith was a master at using huge three-dimensional sets in such movies as Intolerance (1916; cinematographer: G. W. Bitzer). A more sustained effort to make the most of deep-space composition began in the late 1920s. Many directors and cinematographers during this decade, especially those who were directing musicals with large casts and big production budgets, experimented with the technique of creating lines of movement from background to foreground to foster the illusion of depth.

For example, in Applause (1929; cinematographer: George Folsey), Rouben Mamoulian created spatial depth by organizing a line of burlesque

Shot types

[1] Extreme long shot An extreme long shot of the exterior of Sandringham House, from which King George V delivers his annual Christmas address, humiliating his son in the process. [2] Long shot A long shot of the interior of Westminster Abbey, where the archbishop of Canterbury and other church officials discuss the forthcoming inauguration of King George VI. [3] Medium long shot A medium long shot of the interior of Lionel Logue’s studio. The physical distance between the Duke of York and his mentor reflects both royal protocol and the duke’s reluctance to undertake therapy. [4] Medium shot A medium shot showing Mrs. Wallis Simpson greeting guests at Balmoral House, acting, quite characteristically, as if she owned the place. [5] Close-up shot In this close-up shot, we see (and of course hear) King George VI, having overcome his stammer through diligent therapy, deliver the most important radio address of his reign, one that galvanized people’s support of him. [6] Medium close-up shot In this medium close-up shot, at the outset of the future king’s lessons, we see Lionel Logue, his mentor, a figure whose poise and confidence are evident throughout the movie. [7] Extreme close-up shot In this extreme close-up shot, we see one aspect of speech therapy: The Duke of York’s repeatedly saying the word “father” as if to make the king’s intimidation of him vanish from his consciousness.
From the earliest years of film history, filmmakers have experimented with achieving different illusions of depth. [1] Rouben Mamoulian created a very effective illusion of spatial depth in *Applause* (1929; cinematographer: George Folsey) by organizing a line of burlesque dancers to move from the stage in the back of the image, across the runway that bisects the audience in the middle of the image, to the viewer, sitting, presumably, in the right-hand corner of the foreground of the screen. Even though it was not yet possible to maintain clear focus from the foreground to background, dancers to move from the stage in the back of the image, across the catwalk that ran through the audience in the middle of the image, to the viewer, sitting, presumably, in the right-hand corner of the foreground of the screen. Director Mervyn LeRoy achieved a more elaborate effect with Busby Berkeley’s choreography in *Gold Diggers of 1933* (1933).

Although these elaborately choreographed scenes reveal progress toward the goal of creating a cinematic image with greater depth, during the 1930s the traditional method of suggesting cinematic depth was to use an LS and place significant characters or objects in the foreground or middle-ground planes and then leave the remainder of the image in a soft-focus background. The filmmaker could also reverse this composition and place the significant figures in the background of the image with a landscape, say, occupying the foreground and middle ground. Thus, in both of these examples the cinematic space is arranged to draw the viewer’s eyes toward or away from the background. With such basic illusions, our eyes automatically give depth to the successive areas of the image as they seem to recede in space.

Also during the 1930s, however, various cinematographers experimented with creating a deeper illusion of space through cinematographic rather than choreographic means. Of these cinematographers, none was more important than Gregg Toland, who was responsible for bringing the previous developments together, improving them, and using them most impressively in John Ford’s *The Long Voyage Home* (1940) and soon after in Orson Welles’s *Citizen Kane* (1941). By the time he shot these two films, Toland had already rejected the soft-focus, one-plane depth of the established
Deep-focus cinematography and deep-space composition in *Citizen Kane*  Gregg Toland built on the work of previous directors, such as Allan Dwan, one of the most formally innovative of early film directors, who used deep-space composition in *The Iron Mask* (1929; cinematographers: Warren Lynch and Henry Sharp), a silent swashbuckler featuring Douglas Fairbanks. Dwan could open up any shot into a complex, three-dimensional space with strategically placed foreground, middle ground, and background figures or objects. Similarly, in this beautiful deep-space composition from Orson Welles’s *Citizen Kane* (1941), Toland exploits all three planes of depth along a line that draws our eye from screen right to screen left. In the foreground, we see the reporter Mr. Thompson (William Alland) in a closed telephone booth; in the middle ground, outside the booth, we see the headwaiter of the El Rancho nightclub; and in the background, Susan Alexander Kane (Dorothy Comingore), the subject of Thompson’s visit. Each character is photographed in clear focus in a unified setting, yet each is in a separate physical, psychological, and emotional space.

Hollywood style; experimented with achieving greater depth; created sharper black-and-white images; used the high-powered Technicolor arc lights for black-and-white cinematography; used Super XX film stock, which produced a clearer image and was four times faster than previously available black-and-white stock; coated his lenses (to cut down glare from the lights); and used a camera equipped with a blimp so that he could work in confined spaces.

In *Citizen Kane*, these methods came together in two related techniques: a deliberate use of (1) deep-space composition, a total visual composition that places significant information or subjects on all three planes of the frame and thus creates an illusion of depth, coupled with (2) deep-focus cinematography, which, using the short-focal-length lens, keeps all three planes in sharp focus. Deep-space composition permits the filmmaker to exploit the relative size of people and objects in the frame to convey meaning and conflict.

Toland’s pioneering work on *Citizen Kane* had a profound influence on the look of subsequent movies and helped to distance Hollywood even further from the editing-centered theories of the Russian formalist directors (e.g., Sergei Eisenstein); Toland also brought American moviemaking closer.
Use of deep-space composition in *The Little Foxes*

At the climax of William Wyler’s *The Little Foxes* (1941; cinematographer: Gregg Toland), Horace (Herbert Marshall) responds to his wife’s tirade [1], begins having a heart attack, and rises [2] while Regina (Bette Davis) remains rigidly in place [3], offering Horace no help as he staggers to his death in the background, helpless and out of focus [4].

...to the realism of such European directors as Jean Renoir. French film critic André Bazin emphasizes that deep-focus cinematography “brings the spectator into a relation with the image closer to that which he enjoys with reality” and “implies, consequently, both a more active mental attitude on the part of the spectator and a more positive contribution on his part to the action in progress.” In preserving the continuity of space and time, deep-focus cinematography seems more like human perception.

Toland also understood that a scene involving deep-space composition did not necessarily have to be shot with deep-focus cinematography, as he demonstrated in William Wyler’s *The Little Foxes* (1941). Perhaps the best example is found in a scene in which Regina Giddens (Bette Davis) confronts her severely ill husband, Horace Giddens (Herbert Marshall), a man she detests for his overall opposition to her scheming brothers and their plan to expand her family’s wealth by exploiting cheap labor. The sequence takes place in their parlor after

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Horace has returned home from a long hospital stay for treatment of his serious heart condition. When Regina asks him to put more funds into strengthening the family enterprise, he tells her that he has changed his will, leaving her nothing but bonds, which, he does not realize, members of the family have already stolen for the same purpose. Realizing that a man she despises has unknowingly trapped her in a difficult and illegal situation, Regina retaliates by telling him that she has always hated him. During her tirade, Horace has the first seizures of a heart attack. While attempting to take his medicine, he drops the bottle; when he asks Regina to get the spare bottle upstairs, she makes the decision to let him die and sits perfectly still as he staggers toward the stairs and collapses. As Horace struggles toward the stairs behind Regina, who is in the foreground, he grows progressively more out of focus, but he and his actions certainly are significant subject material. He goes out of focus for a specific reason—he is dying—and the shot is still very much deep-space composition but not deep focus. Even though he is out of focus in the deep background of the frame, Horace remains significant to the outcome of the story.

The coupling of deep-space composition and deep-focus cinematography is useful only for scenes in which images of extreme depth within the frame are required because the planning and choreography required to make these images are complex and time-consuming. Most filmmakers employ less complicated methods to maximize the potential of the image, put its elements into balance, and create an illusion of depth. Perhaps most important among these methods is the compositional principle known as the rule of thirds. This rule, like so many other “rules” in cinema, is a convention that can be adapted as needed. It takes the form of a grid pattern that, when superimposed on the image, divides it into horizontal thirds representing the foreground, middle ground, and background planes and into vertical thirds that break up those planes into further elements. This grid assists the designer and cinematographer in visualizing the overall potential of the height, width, and depth of any cinematic space.

You can watch the rule of thirds in action in a motion picture by placing four strips of ¼-inch masking tape on your television screen (to conform to the interior lines in the grid) and then looking at any movie being shown in the standard Academy aspect ratio (1.33:1). The lines will almost invariably intersect those areas of interest within the frame to which the designer and cinematographer wish to draw your attention. Simple as it is, the rule of thirds takes our natural human ability to create balance and gives it an artistic form. Furthermore, it helps direct our eyes to obvious areas of interest within a cinematic composition, reminding us yet again that movies result from a set of deliberate choices.

The rule of thirds, like other filmmaking conventions, is not a hard-and-fast law. Compositions that consciously deviate from the rule of thirds can be effective too, especially when they contrast with other compositions in the same film. In Stanley Kubrick’s *Spartacus* (1960; cinematographer: Russell Metty), for example, the opening title sequence rejects the rule of thirds in favor of a series of perfectly centered compositions that complement the narrative and that contrast with the classically composed shots throughout the rest of the film.

Another common deviation from the rule of thirds is any shot that places the action extremely close to the camera, thus offering little or no visual depth. This is perhaps the most effective method for the filmmaker to indicate that this action is the most important thing at the moment—for example, at a turning point or climax. Such a composition occurs in the final shot of Lewis Milestone’s *The Strange Love of Martha Ivers* (1946; cinematographer: Victor Milner).

Sometimes a filmmaker both uses the rule of thirds and partially rejects it in a single shot. Such shots are generally composed in depth, presenting one part of the action in the foreground and another, equally important part in either the middle ground or background. The shot may begin looking like a classically composed shot that is following the rule of thirds but then, because of the movement of several objects in the frame on all three planes, becomes less balanced and more complex. Such a shot is complex for a reason: the
The rule of thirds  The rule of thirds applies to interior as well as exterior cinematography, particularly in genres such as the Western, where wide-open spaces figure significantly in a movie's meaning. Kit (Martin Sheen), the protagonist of Terrence Malick's Badlands (1973; cinematographers: Tak Fujimoto, Steven Lamer, and Brian Probyn), takes to the road on a violent killing spree, accompanied by his girlfriend Holly (Sissy Spacek). Although not a Western per se, the movie is an American classic both for its focus on the serial killers that are now, unfortunately, part of our culture and its widespread depiction of the flat, deep badlands between the Dakotas and the Canadian border. In this image, Kit (with his arms looped over his rifle) takes stock of himself on the eve of his final spree. The rising moon occupies the deep background plane of the image; the dust-filled air of the landscape dominates the middle ground. Kit is walking toward us in the foreground, looking something like a scarecrow (an object that is frightening, but not dangerous). This character, isolated in the natural grandeur, gives no hint of what evil he will do tomorrow.

The filmmaker is probably attempting to call special attention to the relationship between the action in the foreground and that in the middle ground or background in order to establish a theme or to convey a number of narrative ideas simultaneously. In the long shot from Terrence Malick's Days of Heaven (1978; cinematographer: Néstor Almendros) pictured on the next page, composition of this sort establishes a very important hierarchical relationship between the characters in the foreground and the character (represented by his distaant and visually aloof mansion) in the background.

In addition to helping filmmakers achieve distribution and balance in the general relationship of what we see on the screen, the rule of thirds helps cinematographers ensure that compositions flow appropriately from one shot to another. Without
Composition with limited depth  In the final scene of Lewis Milestone's The Strange Love of Martha Ivers (1946; cinematographer: Victor Milner), Walter O'Neil (Kirk Douglas) points a gun at Martha Ivers (Barbara Stanwyck), who places her thumb over his finger on the trigger and causes the gun to fire, killing her. The camera eye's proximity to the actors' bodies produces an image with no depth—just the beautifully balanced composition of their hands on the gun next to her waistline.

that visual consistency, the editor will be unable to establish continuity—though he or she may choose to preserve graphic discontinuity as part of telling the story. For the viewer, such visual continuity suggests meanings through the placement and interrelationships of figures on the screen.

Camera Angle and Height

The camera's shooting angle is the level and height of the camera in relation to the subject being photographed. For the filmmaker, it is another framing element that offers many expressive possibilities. The normal height of the camera is eye level, which we take for granted because that's the way we see the world. Because our first impulse as viewers is to identify with the camera's point of view—and because we are likely to interpret any deviation from an eye-level shot as somehow different—filmmakers must take special care to use other basic camera angles—high angle, low angle, Dutch angle, and aerial view—in ways that are appropriate to and consistent with a movie's storytelling.

The phrases to look up to and to look down on reveal a physical viewpoint and connote admiration or condescension. In our everyday experience, a high angle is a position of power over what we're looking at, and we intuitively understand that the subject of a high-angle view is inferior, weak, or vulnerable in light of our actual and cultural experiences. A filmmaker shooting from a high angle must be aware of this traditional interpretation of that view, whether or not the shot will be used to confirm or undermine that interpretation. Even a slight upward or downward angle of a camera may be enough to express an air of inferiority or superiority.

Eye Level  An eye-level shot is made from the observer's eye level and usually implies that the camera's attitude toward the subject being photographed is neutral. An eye-level shot used early in a movie—as part of establishing its characters, time, and place—occurs before we have learned the
Eye-level shot In John Huston's *The Maltese Falcon* (1941; cinematographer: Arthur Edeson), this eye-level shot, used throughout the initial meeting of Miss Wonderly (Mary Astor) and Sam Spade (Humphrey Bogart), leads us to the false belief that the facts of their meeting are "on the level."

By contrast, an eye-level shot that occurs in *The Grifters* (1990; cinematographer: Oliver Stapleton), comes later in the movie, after the director, Stephen Frears, has established a narrative context for interpreting his characters and their situation. From the beginning of the film, we know that Lilly Dillon (Anjelica Huston) and her son, Roy (John Cusack), are grifters, or con artists. After an eight-year estrangement they meet again, but each still regards suspiciously everything the other says or does. The eye-level shot reveals the hollow dialogue and tension of their reunion and is thus ironic, since they know, as we do, that their relationship is off balance (not "on the level").

**High Angle** A high-angle shot (also called a high shot or down shot) is made with the camera above the action and typically implies the observer's sense of superiority to the subject being photographed. In Rouben Mamoulian's *Love Me Tonight* (1932; cinematographer: Victor Milner), Maurice Courtelin (Maurice Chevalier) finally admits to Princess Jeanette (Jeanette MacDonald) that he is not an aristocrat, but rather an ordinary tailor. Although the princess loves him, she runs from the room in confusion, and the camera looks down on Maurice, who is now left to assess his reduced status with the symbolic measuring tape in his hands.

Sometimes, however, a high-angle shot can be used to play against its traditional implications. In Alfred Hitchcock's *North by Northwest* (1959; cinematographer: Robert Burks), one of the villains, Phillip Vandamm (James Mason), tells his collaborator, Leonard (Martin Landau), that he is taking his mistress, Eve Kendall (Eva Marie Saint), for a trip on his private plane. Vandamm knows that Kendall is part of an American spy ring that has discovered his selling of government secrets to the enemy, and he plans to kill her by pushing her out of the aircraft. As he speaks, the crane-mounted camera rises to a very high angle looking down at the two men, and Vandamm concludes, "This matter is best disposed of from a great height. Over water." The overall effect of this shot depends completely on this unconventional use of the high angle: it does not imply superiority, but rather emphasizes Vandamm's deadly plan. Its ironic, humorous effect depends as well on James Mason's wry delivery of these lines.

**Low Angle** A low-angle shot (or low shot) is made with the camera below the action and typically places the observer in the position of feeling helpless in the presence of an obviously superior force, as when we look up at King Kong on the Empire State Building or up at the shark from the underwater camera's point of view in *Jaws*. In Spike Lee's *Do the Right Thing* (1989; cinematographer:...
High-angle shot  [1] In this scene from Rouben Mamoulian's *Love Me Tonight* (1932; cinematographer: Victor Milner), the high-angle shot has the traditional meaning of making the subject seem inferior. After Maurice Courtelin (Maurice Chevalier) admits that he is not an aristocrat but rather an ordinary tailor, the camera looks down on him as he is left to assess his future with a symbolic measuring tape in his hands. [2] This shot from Alfred Hitchcock's *North by Northwest* (1959; cinematographer: Robert Burks), although taken from a high angle, makes Phillip Vandamm (James Mason) and Leonard (Martin Landau), who are planning to murder Vandamm's mistress by pushing her out of his private airplane, appear even more menacing than they have up to this point.

Low-angle shot  Two faces, both shot at low angle, convey two different meanings. [1] A low-angle shot of Radio Raheem (Bill Nunn) from Spike Lee’s *Do the Right Thing* (1989; cinematographer: Ernest Dickerson) puts us in the position of Sal (Danny Aiello, not pictured), a pizzeria owner who is intimidated and angered by his boom box-carrying customer. [2] In Stanley Kubrick’s *The Shining* (1980; cinematographer: John Alcott), a low-angle shot from an omniscient point of view reveals the depth of Wendy’s (Shelley Duvall) panic and despair.

However, filmmakers often play against the expectation that a subject shot from a low angle is menacing or powerful. In Stanley Kubrick’s *The Shining* (1980; cinematographer: John Alcott), Wendy (Shelley Duvall) discovers a manuscript that suggests her husband, Jack (Jack Nicholson),
Camera angles in *M*  This scene from Fritz Lang's *M* (1931; cinematographer: Fritz Arno Wagner)—in which an innocent man becomes the object of a crowd's suspicions—uses eye-level, low-angle, and high-angle shots to provide a context for us to distinguish real threats from perceived ones.  [1] A neutral (and accidental) meeting between a short man and a little girl occurs in a context of suspicion (the city of Berlin has suffered a number of child murders in a short span of time).  [2] The short man's perspective, an exaggerated low-angle shot, makes the question “Why were you bothering that kid?” even more ominous than the man's tone of voice makes it.  [3] A high-angle shot from the perspective of a tall man who has brusquely asked, “Is that your kid?” reinforces the short man's modest stature and relative powerlessness.  [4] Here we return to an LS as the short man protests his innocence and a crowd—soon to be a mob—gathers round.

is insane, and a low-angle shot emphasizes her anxiety, fear, and vulnerability. The shot also reminds us that the visual and narrative context of an angle affects our interpretation of it. The shot places Jack's typewriter in the foreground, thus making it appear very large, which implies its power over her and the threatening nature of what she is seeing (even before it is revealed to us). The low angle also denies us the ability to see what is going on behind her at a moment in which we fear (and expect) the newly mad Jack to creep up behind her—thus elevating the suspense and making a character seen in extreme low angle appear more vulnerable than any high-angle shot could have.

In most scenes, obviously, different angles are used together to convey more complex meanings.
Dutch-angle shot  In *Bride of Frankenstein* (1935; cinematographer: John J. Mescall), director James Whale uses Dutch-angle shots to enhance the campy weirdness of the lab work in this film [1]. This scene culminates in one of the most famous Dutch-angle shots of all time—that of the Bride (Elsa Lanchester) first seeing the Monster [2].

Neill Jordan's *The Crying Game* (1992; cinematographer: Ian Wilson), for example, uses alternating camera angles to convey and then resolve tensions between two characters. The scene begins with a confrontation between Fergus (Stephen Rea), an IRA gunman, and Jody (Forest Whitaker), a British-born black soldier whom Fergus and his terrorist cohorts have taken hostage. Power, race, and politics separate them, as confirmed by an alternating use of high- and low-angle shots from the perspectives of both characters during their dialogue. They start to relax when Jody shows Fergus a picture of his “wife,” and by the time Jody talks about his experiences as a cricketer player, they are speaking as men who have much in common—a transition that is signaled by a series of shots taken at eye level. These final shots help demonstrate that the men have more in common than their differences had at first suggested.

Dutch Angle  In a Dutch-angle shot (also called a Dutch-tilt shot or oblique-angle shot), the camera is tilted from its normal horizontal and vertical position so that it is no longer straight, giving the viewer the impression that the world in the frame is out of balance. Two classic films that use a vertiginously tilted camera are John Ford's *The Informer* (1935; cinematographer: Joseph H. August) and Carol Reed's *The Third Man* (1949; cinematographer: Robert Krasker). For the sequence in *Bride of Frankenstein* (1935; cinematographer: John J. Mescall) in which Dr. Frankenstein (Colin Clive) and Dr. Pretorius (Ernest Thesiger) create a bride (Elsa Lanchester) for the Monster (Boris Karloff), director James Whale creates a highly stylized mise-en-scène—a tower laboratory filled with grotesque, futuristic machinery—that he shoots with a number of Dutch angles. The Dutch angles accentuate the nature of the doctors' unnatural actions, which are both funny and frightening.

Aerial View  An aerial-view shot (or bird's-eye-view shot), an extreme type of point-of-view shot, is

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7The adjective Dutch (as in the phrases Dutch uncle, Dutch treat, and Dutch auction) indicates something out of the ordinary or, in this case, out of line. This meaning of Dutch seems to originate with the English antipathy for all things Dutch at the height of Anglo-Dutch competition during the seventeenth century. I am grateful to Russell Merritt for clarifying this for me.
taken from an aircraft or very high crane and implies the observer's omniscience. A classic example of the aerial view comes, naturally enough, from Alfred Hitchcock's *The Birds* (1963; cinematographer: Robert Burks). After showing us standard high-angle shots of a massive explosion at a gas station, the director cuts to a high aerial shot (literally a bird's-eye view) in which the circling birds seem almost gentle in contrast to the tragedy they have just caused below. Hitchcock said he used this aerial shot to show, all at once, the gulls massing for another attack on the town, the topography of the region, and the gas station on fire. Furthermore, he did not want to "waste a lot of footage on showing the elaborate operation of the firemen extinguishing the fire. You can do a lot of things very quickly by getting away from something." 8

**Scale**

Scale is the size and placement of a particular object or a part of a scene in relation to the rest—a relationship determined by the type of shot used and the position of the camera. Scale may change from shot to shot. From what you learned in the preceding sections, it should be clear that the type of shot affects the scale of the shot and thus the effect and meaning of a scene. In *Jurassic Park* (1993; cinematographer: Dean Cundey), as in most of his movies, Steven Spielberg exploits scale to create awe and delight. The director knows that we really want to see dinosaurs—the stars of the film, after all—and he slowly builds our anticipation by delaying this sight. When he introduces the first dinosaur, he maximizes—through the manipulation of scale and special-effects cinematography—the astonishment that characters and viewers alike feel.

At *Jurassic Park*, jeeps carrying the group arrive on a grassy plain, clearly establishing the human scale of the scene. But Drs. Grant (Sam Neill) and Sattler (Laura Dern), preoccupied with scientific talk, take a moment to realize that Hammond (Richard Attenborough) has just introduced them to a live dinosaur; as benign as it is huge, which looks down upon them. ELSs make the dinosaur seem even taller. When the dazed Grant asks, "How did you do this?" Hammond replies, "I'll show you." It's impossible to forget what Spielberg then shows us: not just the first dinosaur, but also a spectacular vista in which numerous such creatures move slowly across the screen. Creating a sense of wonder is one of Spielberg's stylistic trademarks, and his use of scale here does just that as it also helps create meaning. Because this is a science-fiction film, we are prepared for surprises when we are introduced to a world that is partly recognizable.

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and partly fantastic. Once the dinosaurs make their actual appearance, we know that humans, however powerful in their financial and scientific pursuits, are now small in comparison and therefore highly vulnerable.

Of course, the scale of small objects can be exaggerated for meaningful effect too, as in the example from Alfred Hitchcock's *Notorious* (1946) mentioned earlier (see page 255). When a tiny cup (or any other small object) looms larger than anything else in the frame, we can be sure that it is important to the film's meaning.

**Camera Movement**

Any movement of the camera within a shot automatically changes the image we see because the elements of framing that we have discussed thus far—camera angle, level, height, types of shots, and scale—are all modified when the camera moves within that shot. The moving camera, which can photograph both static and moving subjects, opens up cinematic space, and thus filmmakers use it to achieve many effects. It can search and increase the space, introduce us to more details than would be possible with a static image, choose which of these details we should look at or ignore, follow movement through a room or across a landscape, and establish complex relationships between figures in the frame—especially in shots that are longer than the average. It allows the viewer to accompany or follow the movements of a character, object, or vehicle, as well as to see the action from a character's point of view. The moving camera leads the viewer's eye or focuses the viewer's attention and, by moving into the scene, helps create the illusion of depth in the flat screen image. Furthermore, it helps convey relationships: spatial, causal, and psychological. When used in this way, the moving camera adds immeasurably to the director's development of the narrative and our understanding of it.

Within the first decade of movie history, D. W. Griffith began to exploit the power of simple camera movement to create associations within the frame and, in some cases, to establish a cause-and-effect relationship. In *The Birth of a Nation* (1915; cinematographer: G. W. Bitzer), within one shot he establishes a view of a Civil War battle, turns the camera toward a woman and small children on a wagon, and then turns back to the battle. From that instinctive, fluid camera movement we understand the relationship between the horror of the battle and the misery that it has created for innocent civilians. Of course, Griffith could have cut between shots of the battle and the bystanders, but breaking up the space and time with editing would not achieve the same subtle effect as a single shot does.

In the 1920s, German filmmakers took this very simple type of camera movement to the next level, perfecting fluid camera movement within and between shots. In fact, F. W. Murnau, who is associated with some of the greatest early work with the moving camera in such films as *The Last Laugh* (1924; cinematographer: Karl Freund) and *Sunrise: A Song of Two Humans* (1927; cinematographers: Charles Rosher and Karl Struss), referred to it as the *unchained camera*, thereby suggesting that it has a life of its own, with no limits to the freedom with which it can move. Since then, the moving camera has become one of the dominant stylistic trademarks of a diverse group of directors, including Orson Welles, Max Ophüls, Jean Renoir, Martin Scorsese, Otto Preminger, Lars von Trier, Terrence Malick, and Pedro Almodóvar.

Almodóvar uses the moving camera throughout *Talk to Her* (2002; cinematographer: Javier Aguirresarobe), perhaps most effectively at the very beginning of the movie. After a brief prologue photographed at a dance performance, we see a close-up of Benigno Martín (Javier Cámara) going about his work while he talks about this performance to someone we do not see. Although we don't yet know for certain where he works, we get a clue from his collarless blue shirt, one often worn by hospital nurses or orderlies. As the camera moves down from his face, we see that he is manicuring someone's nails, probably a woman's, but we don't yet know her identity or if she is interested in the story he is telling her. Still within the first shot, the camera moves to the right and reframes to a close-up of a woman lying in a bed, her eyes closed and a serene look on her face.

The gradual unfolding of the context of this scene grabs our interest and prompts us to ask, as
each new detail is revealed by the moving camera, more questions about the relationship between these two people. After a series of shots immediately following this first one, we come to understand that the woman is Alicia (Leonor Watling), a young ballet student who has been in a coma in this hospital for four years, and that she is totally unaware of what is happening to and around her. Benigno, a respected member of the hospital staff, has fallen in love with her—a doomed endeavor it would seem, considering that he is homosexual and she is unlikely to recover. Throughout this complex story, Almodóvar uses the most subtle moving camera shots to reveal the psychological relationship between Benigno and Alicia.

The smoothly moving camera helped change the way movies were made and also the ways in which we see and interpret them. But before the camera was capable of smooth movement, directors and their camera operators had to find ways to create steady moving shots that would imitate the way the human eye/brain sees. When we look around a room or landscape or see movement through space, our eyes dart from subject to subject, from plane to plane, and so we “see” more like a series of rapidly edited movie shots than a smooth flow of information. Yet our eyes and brain work together to smooth out the bumps. Camera motion, however, must itself be smooth in order for its audience to make sense of (or even tolerate) the shots that result from that motion. The moving camera can also create suspense and even fear, as in Roman Polanski’s Rosemary’s Baby (1968; cinematographer: William Fraker), where the camera moves through a luxurious Manhattan apartment, peering around corners or into rooms just enough to keep you on the edge of your seat without letting you see what you know (or think you know) is there.

There are exceptions, of course: during the 1960s, nonfiction filmmakers began what was soon to become a widespread use of the handheld camera, which both ushered in entirely new ways of filmmaking, such as cinéma vérité and direct cinema, and greatly influenced narrative film style. For the most part, however, cinematographers strive to ensure that the camera does not shake or jump while moving through a shot. To make steady moving shots, the camera is usually mounted on a tripod, where it can move on a horizontal or vertical axis, or on a dolly, crane, car, helicopter, or other moving vehicle that permits it to capture its images smoothly.

The basic types of shots involving camera movement are the pan, tilt, tracking, dolly, and crane shots, as well as those made with the Steadicam, the handheld camera, or the zoom lens. Each involves a particular kind of movement, depends on a particular kind of equipment, and has its own expressive potential.

Pan Shot A pan shot is the horizontal movement of a camera mounted on the gyroscopic head of a stationary tripod. This head ensures smooth panning and tilting and keeps the frame level. The pan shot offers us a larger, more panoramic view than a shot taken from a fixed camera; guides our attention to characters or actions that are important; makes us aware of relationships between subjects that are too far apart to be shown together in the frame; allows us to follow people or objects; and attempts to replicate what we see when we turn our heads to survey a scene or follow a character. Pan shots are particularly effective in settings of great scope, such as the many circus scenes in Max Ophüls’s Lola Montès (1955; cinematographer: Christian Matras) or the ballroom sequence in
Tilt shot In Orson Welles's *Citizen Kane* (1941; cinematographer: Gregg Toland), the camera presents the first half of this shot [1], then tilts upward to present the second half [2]. Of course, Welles could have shown us both halves, even Kane's entire body, within one static frame. The camera movement directs our eyes, however, and makes the symbolism unmistakable.

Dolly Shot A dolly shot (also known as a tracking shot or traveling shot) is one taken by a camera fixed to a wheeled support, generally known as a dolly. The dolly permits the cinematographer to make noiseless moving shots. When a dolly runs on tracks, the resulting shot is called a tracking shot. The dolly shot is one of the most effective (and consequently most common) uses of the moving camera. When the camera is used to dolly in on (move toward) a subject, the subject grows in the frame, gaining significance not only through being bigger in the frame but also through those moments in which we actually see it growing bigger.

This gradual intensification effect is commonly used at moments of a character's realization and/or finally summons the psychological and emotional strength to leave her tyrannical husband, he reacts by destroying her bedroom. At the peak of his violent rage, he seizes the glass globe with an interior snow scene; the camera tilts upward from the ball to Kane's (Welles) face; he whispers “Rosebud” and leaves the room. The tilt links the roundness and mystery of the glass ball with Kane's round, bald head; furthermore, it reminds us that the first place we saw the glass ball was on Susan's dressing table in her rooming-house bedroom, thus further linking the meaning of Rosebud with her.

Dolly in action Camera operators race alongside a speeding chariot on a dolly during the filming of Ridley Scott's *Gladiator* (2000; cinematographer: John Mathieson).
decision, or as a point-of-view shot of what the character is having a realization about. The scene in Hitchcock's *Notorious* (1946), in which Alicia Huberman (Ingrid Bergman) realizes that she is being poisoned via the coffee (see page 255), uses both kinds of dolly-in movements, as well as other camera moves that explicitly illustrate cause and effect (the camera moves from the coffee to Bergman at the moment she complains about not feeling well, for example).

The **dolly-out** movement (moving away from the subject) is often used for slow disclosure, which occurs when an edited succession of images leads from A to B to C as they gradually reveal the elements of a scene. Each image expands on the one before, thereby changing its significance with new information. A good example occurs in Stanley Kubrick's *Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb* (1964; cinematographer: Gilbert Taylor) when—in a succession of images—the serious, patriotic bomber pilot is revealed to be concentrating not on his instruments, but on an issue of *Playboy* magazine instead.

The **tracking shot** is a type of dolly shot that moves smoothly with the action (alongside, above, beneath, behind, or ahead of it) when the camera is mounted on a wheeled vehicle that runs on a set of tracks. Some of the most beautiful effects in the movies are created by tracking shots, especially when the camera covers a great distance. Director King Vidor used an effective lateral tracking shot in his World War I film *The Big Parade* (1925; cinematographers: John Arnold and Charles Van Enger) to follow the progress of American troops entering enemy-held woods. This shot, which has a documentary quality to it because it puts us in motion beside the soldiers as they march into combat, has been repeated many times in subsequent war films.

Jean Renoir used the moving camera to create the feeling of real space, a rhythmic flow of action, and a rich mise-en-scène. In *The Grand Illusion* (1937; cinematographer: Christian Matras), Renoir's brilliant film about World War I, we receive an intimate introduction to Captain von Rauffenstein (Erich von Stroheim), the commandant of a German prison camp, through a long tracking shot (plus four other brief shots) that reveals details of his life.

**Zoom** The zoom is a lens that has a variable focal length, which permits the camera operator during shooting to shift from the wide-angle lens (short focus) to the telephoto lens (long focus) or vice versa without changing the focus or aperture settings. It is not a camera movement per se because it is the optics inside the lens that move in relation to each other and thus shift the focal length, yet the zoom can provide the illusion of the camera moving toward or away from the subject. One result of this shift is that the image is magnified (when shifting from short to long focal length) or demagnified by shifting in the opposite direction.

That magnification is the essential difference between **zoom-in** and dolly-in movements on a subject. When dollying, a camera actually moves through space; in the process, spatial relationships between the camera and the objects in its frame shift, causing relative changes in position between

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**Tracking shot** In Jean Renoir's *The Grand Illusion* (1937; cinematographer: Christian Matras), the contradictory aspects of Captain von Rauffenstein's (Erich von Stroheim) life are engagingly and economically captured by the long tracking shot that catalogs the objects in his living quarters. The pistol on top of a volume of Casanova's memoirs is an especially telling detail: von Rauffenstein is a lover and a fighter.
on-screen figures or objects. By contrast, because a zoom lens does not move through space, its depiction of spatial relationships between the camera and its subjects does not change. All a zoom shot does is magnify the image.

The result of zoom shots, as we've noted before, can be “movement” that appears artificial and self-conscious. Of course, there are dramatic, cinematic, and stylistic reasons for using this effect, but for the most part, the artificiality of the zoom (and the fact that viewers naturally associate the zoom effect with its overuse in amateur home videos) makes it a technique that is rarely used well in professional filmmaking. When the zoom shot is used expressively, however, it can be breathtaking. In Goodfellas (1990; cinematographer: Michael Ballhaus), during the scene in which Henry Hill (Ray Liotta) meets Jimmy Conway (Robert De Niro) in a diner, director Martin Scorsese achieves a memorable effect with the moving camera and the zoom lens. He tracks in (while moving the zoom lens out) and tracks out (while moving the zoom lens in) to reflect Henry's paranoid, paralyzed state of mind. As the camera and lens move against one another, the image traps Hill inside the hermetic world of the mob and us inside a world of spatial disorientation in an ordinary diner.

Crane Shot A crane shot is made from a camera mounted on an elevating arm that is, in turn, mounted on a vehicle capable of moving under its own power. A crane may also be mounted on a vehicle that can be pushed along tracks to smooth its movement. The arm can be raised or lowered to the degree that the particular crane permits. Shots made with a crane differ from those made with a camera mounted on a dolly or an ordinary track (each of which is, in theory, capable only of horizontal or vertical movement) because the crane has the full freedom of horizontal and vertical movement, as well as the capability of lifting the camera high off the ground. Thus, a filmmaker can use a crane to shoot with extraordinary flexibility. As equipment for moving the camera has become more versatile, crane shots have become more commonplace.

Any list of memorable crane shots would have to include the shot in Victor Fleming's Gone with the Wind (1939; cinematographer: Ernest Haller) in which the camera soars up over ground near the Atlanta railroad station to reveal the hundreds of Civil War dead and the smooth, graceful shot in Alfred Hitchcock's Notorious (1946; cinematographer: Ted Tetzlaff) in which the camera swoops down alongside a staircase and across a crowded ballroom. Another, more contemporary, crane shot can be seen in Oliver Stone's Alexander (2004; cinematographer: Rodrigo Prieto), the Macedonian warrior Alexander the Great (Colin Farrell) looks up to see the eagle that is his personal symbol. The camera soars up to assume the eagle's point of view and then looks down over the field on which Alexander and his troops will shortly fight the Persians.

Looking at camera movement: Touch of Evil Perhaps the most impressive crane shot in movie history occurs at the opening of Orson Welles's Touch of Evil (1958; cinematographer: Russell Metty). The scene takes place at night in Los Robles, a seedy town on the U.S.-Mexico border. After the Universal International logo dissolves from the screen, we see a close-up of a man's hand swinging toward the camera and setting a timer that will make the bomb he holds explode in about three minutes. The camera pans left to reveal two figures approaching the camera from the end of a long interior corridor; the
The crane shot in *Touch of Evil* These stills from the opening crane shot in Orson Welles's *Touch of Evil* (1958; cinematographer: Russell Metty) show the progress of the camera over a wide-ranging space through a continuous long shot that ends only at the point where the car blows up [1–7].

270 CHAPTER 6 CINEMATOGRAPHY

A reaction shot of Mike and Susan Vargas (Charlton Heston and Janet Leigh) follows [8], and as the Vargases run toward the site of the explosion, the mystery at the heart of the movie begins to unfold.
bomber, Manelo Sanchez (Victor Millan), runs left into the frame, realizes that these people are his targets, and runs out of the frame to the right as the camera pans right to follow him. He places the bomb in the trunk of a luxurious convertible, the top of which is down, and disappears screen right just as the couple enters the frame at top left; the camera tracks backward and reframes into an LS.

As the couple gets into the car, the camera (mounted on a crane that is attached to a truck) swings to an extreme high angle. The car pulls forward alongside a building and turns left at the front of the building as the camera reaches the roof level at its back. We momentarily lose sight of the car; but the camera, which has oriented us to where the car is, merely pans left and brings it back into the frame as it moves left across an alley into a main street. The camera cranes down to an angle slightly higher than the car, which has turned left and now heads toward the camera on a vertical axis moving from background to foreground. When the car pauses at the direction of a policeman, who permits other traffic to cross in the foreground on a horizontal axis, the camera begins tracking backward to keep the car in the frame. The camera continues to track backward, reframes to an XLS, and pans slightly to the left. The car stops at an intersection.

A man and a woman ("Mike" Vargas, a Mexican narcotics agent played by Charlton Heston, and Susan Vargas, whom he has just married, played by Janet Leigh) enter the intersection at screen right and continue across the street as the camera lowers to an eye-level LS. The car turns left onto the street on which the Vargases are walking, and they scurry to get out of its way as the car moves out of the frame. They continue walking with the camera tracking slightly ahead of them; it keeps them in the frame as they pass the car, which is now delayed by a herd of goats that has stopped in another intersection. The camera continues to track backward, keeping the couple and the car in the frame; this becomes a deep-space composition with the car in the background, crossway traffic in the middle ground, and the Vargases couple in the foreground. The Vargases reach the kiosk marking the entrance to the border crossing and pass it on the right, still walking toward the camera, which now rises, reframing into a high-angle LS that reveals the car driving past the left side of the kiosk. The frame now unites the two couples (one in the car, the other walking) as they move forward at the same time to what we, knowing that the bomb is in the car, anticipate will be a climactic moment.

The camera stops and reframes to an MS with the Vargases standing on the right and the car stopped on the left. While a border agent begins to question the newlyweds, soon recognizing Vargas, a second agent checks the car's rear license plate. The agents and Vargas discuss smashing drug rings, but Vargas explains that he and his wife are crossing to the American side so that his wife can have an ice cream soda. Meanwhile, the driver of the targeted car, Mr. Linnekar (actor not credited), asks if he can get through the crossing. The Vargases walk out of the frame, continuing the discussion about drugs, then apparently walk around the front of the car and reenter the frame at the left side; the camera pans slightly left and reframes the Vargases, border agents, and Linnekar and Zita (Joi Lansing), his companion.

After a few moments of conversation, the Vargases walk away toward the back and then left of the frame; the car moves slowly forward, and Zita complains to one of the guards—in a moment of delicious black humor—that she hears a "ticking noise." As the car leaves the frame, the camera pans left to another deep-focus composition with the Vargases in the background, two military policemen walking from the background toward the camera, and pedestrians passing across the middle ground. The camera tracks forward and reframes to an MS; the Vargases embrace as the bomb explodes. Started, they look up and see the car in flames.

The final two shots in this extraordinary sequence are first, a rapid zoom-in on the explosion and second, a low-angle, handheld shot of Vargas running toward the scene. These shots, more self-conscious and less polished than the preceding fluid crane shots, cinematically and dramatically shift the tone from one of controlled suspense to out-of-control chaos that changes the normal world and sets the scene for the story's development. This is also an excellent example of how movies exploit the establishment and breaking of narrative forms.
With extraordinary virtuosity, Welles has combined nearly all types of shots, angles, framings, and camera movements. He accomplishes the changes in camera height, level, angle, and framing by mounting the camera on a crane that can be raised and lowered smoothly from ground level to an extreme high angle, reframed easily, and moved effortlessly above and around the setting (parking lot, market arcade, street, intersections, and border inspection area). Here the moving camera is both unchained and fearless, a thoroughly omniscient observer as well as a voyeur, particularly in its opening observations of the bomber. But what is the function of this cinematographic tour de force? Is it just one of Welles's razzle-dazzle attempts to grab the audience's attention, or does it create meaning?

The answer, of course, is that it has both purposes. Its virtuosity astonishes but with a point. In addition to witnessing the inciting device for the plot, we learn that Los Robles is a labyrinth of activity, lights, shadows, and mysteries and that the destinies of Linnekar, Zita, Vargas, and Susan are in some way tangled. The odd and extreme camera angles (at both the beginning and the end of the scene) reinforce the air of mystery and disorient us within the cinematic space. All the while, the bold black-and-white contrasts pull us into the deep shadows of vice, corruption, and brutal crime.

**Handheld Camera** The last two shots in the scene from *Touch of Evil* (1958) described in the previous section were made with a handheld camera, a small, portable, lightweight instrument that is held by the camera operator during shooting. At one time, handheld cameras were limited to 8mm or 16mm film stock, but now they can handle a variety of film gauges. In contrast to the smooth moving camera shots that we have been discussing, the inherent shakiness of the handheld camera can be exploited when a loss of control, whether in the situation or in the character's state of mind, is something the filmmaker wants to convey to the viewer. *Touch of Evil* does just that, with an elaborately choreographed and fluid moving camera sequence suddenly interrupted by an explosion, which is photographed with a shaky handheld. We feel that the world has changed because the way we see the world has shifted so dramatically.

However, the uses of the handheld camera go beyond that. After nearly fifty years of viewing news coverage of unfolding events, nonfiction films in the direct cinema style, and reality television shows, audiences have been conditioned to associate the look of handheld camera shots with documentary realism—that is, with the assumption that something is really happening and the photographer (and therefore the viewer) is there. Narrative feature films can take advantage of that intuitive association to heighten or alter our experience of a particular event, such as the attack on the military base in Stanley Kubrick's *Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb* (1964; cinematographer: Gilbert Taylor), the influential documentary-style of cinematographer Haskell Wexler in such movies as Milos Forman's *One Flew over the Cuckoo's Nest* (1975) and John Sayles's *Matewan* (1987), or the astonishing, disorienting handheld shots of cinematographer Oliver Wood in Paul Greengrass's *The Bourne Supremacy* (2004). Other movies that make effective use of the handheld camera include Stefan Ruzowitzky's *The Counterfeiters* (2007; cinematographer: Benedict Neuenfels), Matt Reeves's *Cloverfield* (2008; cinematographer: Michael Bonvillain), and John Carney's *Once* (2006; cinematographer: Tim Fleming).

**Steadicam** From the beginning of the movies, movie cameras (handheld as well as those mounted on tripods, dollies, or other moving devices) have
allowed filmmakers to approach their subjects, as when they move in for close-ups. But the handheld camera frequently produces a jumpy image, characteristic of avant-garde filmmaking and usually not acceptable in the mainstream. So mainstream filmmakers embraced the Steadicam, a device attached to the operator’s body that steadies the camera, avoids the jumpiness associated with the handheld camera, and is now much used for smooth, fast, and intimate camera movement. The Steadicam system, which is perfectly balanced, automatically compensates for any movements made by the camera operator, whether in running downstairs, climbing a hill, or maneuvering in tight places where dollies or tracks cannot fit.

The Steadicam is used so frequently that it has all but ceased to call attention to itself. But there are many great, exhilarating uses of this device that are worth remembering, including the work of Garrett Brown, the Steadicam operator on Stanley Kubrick’s The Shining (1980; cinematographer: John Alcott), perhaps the most memorable being the long sequence that follows Danny Torrance’s (Danny Lloyd) determined tricycle ride through the halls of the Overlook Hotel. This sequence may have influenced Matías Mesa, the Steadicam operator on Gus Van Sant’s Elephant (2003; cinematographer: Harris Savides), whose Steadicam-mounted camera unobtrusively follows the wanderings of students in the corridors of their high-school buildings.

Another memorable example is Larry McConkey’s Steadicam shot of Henry and Karen (Ray Liotta and Lorraine Bracco) entering the Copacabana in Martin Scorsese’s Goodfellas (1990; cinematographer: Michael Ballhaus). As in The Shining, the camera stays behind the subjects as they enter the club’s rear entrance and move through the kitchen and various service areas, where everyone knows and greets Liotta’s character, to the club’s main room, where a table is set up for the couple near the stage. This Steadicam sequence is very different from the one used in The Shining. In the Kubrick film, the Steadicam (mounted on a wheelchair) takes us on a dizzying ride through the hotel’s labyrinthine halls, echoing the actual labyrinth in the garden and emphasizing the intense mystery of the story. We are left breath-

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The smoothest-moving camera The Steadicam, invented in the early 1970s, is not a camera but rather a steadying mechanism on which any motion-picture camera can be mounted. In this image of the Steadicam Ultra2 model, the operator wears a harness that is attached to an arm which is connected to a vertical armature, here with the camera at the top and a counterbalance weight at the bottom. Unlike the handheld camera, this mechanism isolates the operator’s movements from the camera, producing a very smooth shot even when the operator is walking or running quickly over an uneven surface.

*Steadicam and Ultra2 are trademarks of the Tiffen Company.*
less at the end of it. In the *Goodfellas* sequence, however, the Steadicam leads the viewer, like a guide, as we follow a brash, young gangster trying to impress his future wife as they enter the glamorous world of a New York nightclub.

**Framing and Point of View**

As the preceding discussion has illustrated, the framing of a shot—including the type of shot and its depth, camera angle and height, scale, and camera movement—has several major functions. In the most basic sense, framing controls what we see (explicitly, what is on the screen; implicitly, what we know has been left out) and how we see it (up close, far away, from above or below, and so on). Framing also calls attention to the technique of cinematography, allowing us to delight in the variety of possibilities that the director and cinematographer have at their disposal. It also implies point of view (POV), which can mean the POV of the screenwriter, director, one or more characters, or the actual POV of the camera itself. Of course, all of these POVs can be used in any one movie.

The camera's POV, the eyes through which we view the action, depends on the physical position from which the camera shoots. In most movies, the camera is omniscient: virtually able to go anywhere and see anything, either at average human eye level or above it. Eye-level, high, and low shooting angles, however, raise questions of objectivity and subjectivity; sometimes, as we have seen, directors use them to play against our expectations, to control or mislead us. In looking at movies, we experience frequent shifts in the camera's POV. The dominant neutral POV gives us the facts and background that are the context in which the characters live. The omniscient POV shows what the omniscient camera sees, typically from a high angle; a single character's POV, in which the shot is made with the camera close to the line of sight of a character (or animal or surveillance camera), shows what that person would be seeing of the action; and the group POV shows us what a group of characters would see at their level.

Julian Schnabel's *The Diving Bell and the Butterfly* (2007; cinematographer: Janusz Kaminski) is a highly concentrated example of a movie shot from the mental and visual POV of a single character. Jean-Dominique Bauby (Mathieu Amalric), the editor of a French magazine, suffered a massive stroke that has left him almost totally paralyzed (he can use one of his eyes), yet able to maintain his sense of humor (often black), remember and think, hear from one ear; move his face and head a little, and most important to his therapy, use his left eyelid to blink for communication (one blink = yes; two = no). He also narrates the film through his interior monologue. (That monologue actually comes from the book that Bauby "wrote" by blinking his eyes for each letter to a collaborator who put the words on paper.) What's relevant here in terms of cinematography is that much of the film is shot from the position and angle of his left eye—what he calls "the only window to my cell." (There are also extreme close-up shots of his eye from a distance of a few inches away.) The images that Bauby and the viewer see simultaneously and identically are blurred, flickering, and bleached out. Bauby is in an extreme position, and the director and cinematographer have chosen a frame that is equally extreme. This movie's visual style meets the needs of this story, which is not a record of impending death but rather the saga of Bauby's highly determined process of rebirth. The movie's consistent
use of this POV might seem gimmicky with a different narrative, but here it rightly puts the emphasis on that character’s eye, the “I” of his narration, and, of course, the camera’s eye.

Consider a very fast and active scene in Alfred Hitchcock’s *The Birds* (1963; cinematographer: Robert Burks), in which a classic use of camera angle and point of view establishes and retains the viewer’s orientation as the townspeople of Bodega Bay become increasingly agitated because of random attacks by birds (see the photo spread on page 276). During one such attack, frightened people watch from the window of a diner as a bird strikes a gas-station attendant, causing a gasoline leak that results in a tragic explosion. Chief among these spectators are Melanie Daniels (Tippi Hedren) and Mitch Brenner (Rod Taylor).

The basic pattern of camera angles alternates between shots from a high angle in the restaurant, looking out and down, to those from eye level, looking from the exterior through the window of the restaurant. These alternating points of view give the sequence its power. How does Hitchcock’s use of alternating points of view create meaning in the sequence?

It shows us (not for the first time) that the birds really do maliciously attack unsuspecting people. It also demonstrates that, at least in this cinematic world, people close to an impending tragedy—people like Mitch, Melanie, and the man with the cigar—can do virtually nothing to stop it.

Two other interesting movies that employ a single character’s POV are Robert Montgomery’s *Lady in the Lake* (1947; cinematographer; Paul C. Vogel)—perhaps the first movie in which the camera gives the illusion of looking through a character’s eyes—and Gaspar Noé’s *Enter the Void* (2010; cinematographer: Benoît Debie), which includes dazzling camera work as the story is shot from a first-person viewpoint with psychedelic imagery reflecting the drug culture depicted.

### Speed and Length of the Shot

Up to this point, we have emphasized the spatial aspects of how a shot is composed, lit, and photographed. But the image we see on the screen has both spatial and temporal dimensions. Its length can be as important as any other characteristic. Although a shot is one uninterrupted run of the camera, no convention governs what that length should be. Before the arrival of sound, the average shot lasted about five seconds; after sound arrived, that average doubled to approximately ten seconds. Nonetheless, a shot can (and should) be as long as necessary to do its part in telling the story.

By controlling the length of shots, not only do filmmakers enable each shot to do its work—establish a setting, character, or cause of a following event—but they also control the relationship of each shot to the others and thus to the rhythm of the film. The length of any shot is influenced by three factors: the screenplay (the amount of action and dialogue written for each shot), the cinematography (the duration of what is actually shot), and the editing (what remains of the length of the actual shot after the film has been cut and assembled).

Here we will concentrate on the second of these factors: the relationship between cinematography and time. What kind of time does the camera record? As you know from Chapter 4, when we see a movie, we are aware of basically two kinds of time: real time, time as we ordinarily perceive it in life outside the movie theater; and cinematic time, time as it is conveyed to us through the movie. Through a simple adjustment of the camera’s motor, cinema can manipulate time with the same freedom and flexibility that it manipulates space and light.

**Slow motion** decelerates action by photographing it at a rate greater than the normal 24 fps (frames per second) so that it takes place in cinematic time less rapidly than the real action that took place before the camera. One effect of slow motion is to emphasize the power of memory, as in Sidney Lumet’s *The Pawnbroker* (1964; cinematographer: Boris Kaufman), in which Sol Nazerman (Rod Steiger), a pawnbroker living in the Bronx, remembers pleasant memories in Germany before the Nazis and the Holocaust. Martin Scorsese frequently uses slow motion to suggest a character’s heightened awareness of someone or something. In *Taxi Driver* (1976), for example, Travis Bickle (Robert De Niro) sees in slow motion what he considers to be the repulsive sidewalks of New York;
Types of shots in The Birds (Opposite) In this action-packed scene from The Birds (1963; cinematographer: Robert Burks), Alfred Hitchcock orients us by manipulating types of shots, camera angles, and points of view. It includes [1] an eye-level medium close-up of Melanie (Tippi Hedren) and two men, who [2] see a gas-station attendant hit by a bird; [3] an eye-level medium shot of Melanie and another woman, who, through high-angle shots such as this close-up [4], watch gasoline run through a nearby parking lot; [5] a slightly low-angle close-up of a group warning a man in the parking lot, seen in this high-angle long shot [6], not to light his cigar, though he doesn't hear the warning; [7] the resulting explosion and fire, seen in a long shot from high angle; and [8] Melanie watching the fire spread to the gas station [9], which the birds observe from on high [10].

and in Raging Bull (1980), Jake La Motta (De Niro) fondly remembers his wife, Vickie (Cathy Moriarty), in slow motion. Both films were shot by cinematographer Michael Chapman. Finally, slow motion can be used to reverse our expectations, as in Andy and Larry Wachowski’s The Matrix (1999; cinematographer: Bill Pope), where Neo (Keanu Reeves) dodges the bullets shot by Agent Smith (Hugo Weaving) while shooting back with a spray of slow-motion bullets as he does cartwheels on the walls—a scene made possible, of course, with advanced special-effects techniques.

By contrast, fast motion accelerates action by photographing it at less than the normal filming rate, then projecting it at normal speed so that it takes place cinematically more rapidly. Thus, fast motion often depicts the rapid passing of time, as F. W. Murnau uses it in Nosferatu (1922; cinematographers: Fritz Arno Wagner and Günther Krampf), an early screen version of the Dracula story. The coach that Count Orlok (Max Schreck) sends to fetch his agent, Hutter (Gustav von Wangenheim), travels in fast motion, and although this effect may seem silly today, its original intent was to place us in an unpredictable landscape. In Rumble Fish (1983; cinematographer: Stephen H. Burum), director Francis Ford Coppola employs fast-motion, high-contrast, black-and-white images of clouds moving across the sky to indicate both the passing of time and the unsettled lives of the teenagers with whom the story is concerned. In Requiem for a Dream (2000; cinematographer: Matthew Libatique), director Darren Aronofsky uses fast motion to simulate the experience of being high on marijuana—an effect also used by Gus Van Sant in Drugstore Cowboy (1989; cinematographer: Robert D. Yeoman).

Perhaps no modern director has used and abused slow and fast motion, as well as virtually every other manipulation of cinematic space and time, more than Godfrey Reggio in his Qatsi trilogy: Koyaanisqatsi (1982; cinematographer: Ron Fricke); Powaqqatsi (1988; cinematographers: Graham Berry and Leonidas Zourdoumis); and Nagyqatsi (2002; cinematographer: Russell Lee Fine). Although Reggio’s sweeping vision of the cultural and environmental decay of the modern world is lavishly depicted in poetic, even apocalyptic, images, he often relies too heavily on manipulation to make his point.

Whereas the average shot lasts ten seconds, the long take can run anywhere from one to ten minutes. (An ordinary roll of film runs for ten minutes, but specially fitted cameras can accommodate longer rolls of film that permit takes of anywhere from fourteen to twenty-two minutes.) One of the most elegant techniques of cinematography, the long take has the double potential of preserving both real space and real time. Ordinarily, we refer to a sequence as a series of edited shots characterized by inherent unity of theme and purpose. The long take is sometimes referred to as a sequence shot because it enables filmmakers to present a unified pattern of events within a single period of time in one shot. Instead, even masters of the evocative long take—directors such as F. W. Murnau, Max Ophüls, Orson Welles, William Wyler, Kenji Mizoguchi, and Stanley Kubrick—combine two or more long takes by linking them, often unobtrusively, into an apparently seamless whole.

Coupled with the moving camera, the long take also eliminates the need for separate setups for long, medium, and close-up shots. It permits the internal development of a story involving two or more lines of action without use of the editing technique called crosscutting that is normally employed to tell such a story. Furthermore, if a
solid sense of cause and effect is essential to developing a sequence, the long take permits both the cause and the effect to be recorded in one take.

Conventional motion-picture technology limited the fluid long take that these directors were striving for; but digital technology has enabled a director to achieve it. Using a Steadicam fitted with a high-definition video camera, Russian director Aleksandr Sokurov made Russian Ark (2002; cinematographer: Tilman Böttner), a 96-minute historical epic filmed in one continuous shot—the longest unbroken shot in film history.

A very effective use of a long take combined with a close-up occurs in Jonathan Glazer’s Birth (2004; cinematographer: Harris Savides), a thriller that skirts the boundaries between the believable and the absurd. Anna (Nicole Kidman), a young widow, is torn between memories of her husband, Sean, and her obsession with a ten-year-old boy, also named Sean (Cameron Bright), who claims to be the reincarnation of her dead husband. At a concert that she attends with her fiancé, Joseph (Danny Huston), Anna listens intently to a selection from an opera that is concerned partly with the incestuous relationship between two mythical characters. This theme obviously invades Anna’s thoughts, as does her unnerving sexual attraction to young Sean. Cinematographer Savides devotes a full two minutes to a long take of Kidman’s face, capturing the subtle shifts in her expression in a way that seems inspired by cinematographer Rudolph Maté’s adoration of the face of Maria Falconetti in Carl Theodor Dreyer’s The Passion of Joan of Arc (1928; see page 326). On one hand, Savides’s haunting, long take is a declaration on Nicole Kidman’s face for two minutes. The slight changes in her expression and the position of her head, eyes, and lips as she listens to music that absorbs her attention reveal, however slightly, the depth of her thoughts.

**The long take and the close-up** Great cinematographers love great female beauty, as demonstrated by these four images from Jonathan Glazer’s Birth (2004), in which cinematographer Harris Savides holds the camera steady.
of love for an actor's face (one of the prime purposes of the close-up); but on the other hand, the length of the shot gives Kidman the time to convey the depth of Anna's thoughts without the use of dialogue or overt action.

Special Effects

Cinema itself is a special effect, an illusion that fools the human eye and brain into perceiving motion. Special effects (abbreviated SPFX or FX) is a term reserved for technology that creates images that would be too dangerous, too expensive, or in some cases, simply impossible to achieve with the traditional cinematographic materials that we have already discussed. As spectacular as SPFX technologies and their effects can be, however, the goal of special-effects cinematography is generally to create verisimilitude—an illusion of reality or a believable alternative reality—within the imaginative world of even the most fanciful movie. Special-effects expert Mat Beck says, “The art of visual effects is the art of what you can get away with, which means you really have to study a lot about how we perceive the world in order to find out how we can trick our perceptions to make something look real when it isn’t.”

In-Camera, Mechanical, and Laboratory Effects

The ability of movies to create illusion has always been one of their major attractions for audiences. Indeed, the first special effect appeared in Alfred Clark's The Execution of Mary Stuart in 1895 (cinematographer: William Heise), the year the movies were born. To depict the queen's execution, Clark photographed the actor in position, stopped filming and replaced the actor with a dummy, then started the camera and beheaded the dummy. (Incidentally, this film involved another kind of illusion: a man, Robert Thomae, played Queen Mary.)

From that point forward, special effects appeared regularly in the films of Georges Méliès, the great illusionist, who used multiple exposures and stop-motion animation. Edwin S. Porter's The Great Train Robbery (1903) featured matte and composite shots, and J. Searle Dawley's Rescued from an Eagle's Nest (1908; cinematographer: Porter) included a mechanical eagle, created by Richard Murphy, that was the forerunner of "animatronic" creatures in contemporary films. By the mid-1920s, extraordinary effects were featured in such films as Fritz Lang's Metropolis (1927; cinematographers: Karl Freund, Günther Rittau, and Walter Ruttmann), for which designer Otto Hunte created the city of the future in miniature on a tabletop; Cecil B. DeMille's first version of The Ten Commandments (1923; cinematographers: Bert Glennon, J. Peverell Marley, Archie Stout, and Fred Westerberg), in which technicians could part the Red Sea because it was made of two miniature slabs of Jell-O and the first of four versions of The Lost World (1925; cinematographer: Arthur Edeson), directed by Harry O. Hoyt. The special effects in The Lost World were the work of Willis H. O'Brien, who went on to create the special effects in Merian C. Cooper and Ernest B. Schoedsack's King Kong (1933; cinematographers: Edward Linden, J. O. Taylor, Vernon L. Walker, and Kenneth Peach), in which the giant ape terrorizing New York City from the top of the Empire State Building was, in fact, a puppet.

Until the advent of computer-generated imagery, in the 1960s, such illusions were accomplished in essentially three ways: through in-camera effects created in the production camera (the regular camera used for shooting the rest of the film) on the original negative, through mechanical effects that create objects or events mechanically on the set and in front of the camera, and through laboratory effects created on a fresh piece of film stock.

Although computer-generated graphics and animation have virtually eclipsed the way special

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*DeMille's 1956 version of the parting of the Red Sea (cinematographically engineered by Loyal Griggs) cost $2 million—the most expensive special effect up to that time—and involved matte shots, miniatures, 600 extras, and a 32-foot-high dam channeling tens of thousands of gallons of water.
Early special effects For Fritz Lang’s *Metropolis* (1927; cinematographers: Karl Freund, Günther Rittau, and Walter Ruttmann), a pioneering science-fiction film, the city of the future was a model created by designer Otto Hunte. Special-effects photography (coordinated by Eugen Schüfftan, who developed trick-shot techniques that are still in use today) turned this miniature into a massive place on-screen, filled with awe-inspiring objects and vistas.

Effects are now made, as you study and analyze SPFX in movies from the past it is helpful to know how the principal types were made. Traditionally, the first category—in-camera effects—has included such simple illusory effects as fade, wipe, dissolve, and montage. (Although these are shots in themselves, together with editing they create transitional effects or manipulate time; for definitions and examples, see “Conventions of Continuity Editing” in Chapter 8.) Other in-camera effects include split screen, superimposition, models and miniatures, glass shots, matte paintings, in-camera matte shots, and process shots.

The second category—mechanical effects—includes objects or events that are created by artists and craftspeople and placed on the set to be photographed. There are, of course, endless examples of such special effects, including the different Frankenstein masks used in the many movies featuring that character, such as Mel Brooks’s *Young Frankenstein* (1974; cinematographer: Gerald Hirschfeld; makeup artist: Edwin Butterworth). Other mechanical creatures include the beast in Ishirō Honda’s Japanese cult film *Godzilla* (1954; cinematographer: Masao Tamai; special effects: Sadamasa Arikawa) and the menacing shark in Steven Spielberg’s *Jaws* (1975; cinematographer: Bill Butler; special effects: Robert A. Mattey and Kevin Pike).

In the third category—laboratory effects—are more complicated procedures, such as contact printing and bipack, as well as blowups, cropping, pan and scan, flip shots, split-screen shots, and day-for-night shooting. These complex technical procedures are outside the scope of this book, but you can find complete information on them in the books by Raymond Fielding, Bruce Kawin, and Ira Konigsberg listed in the bibliography at the back of this book.

**Computer-Generated Imagery**

Since its first use in film in the early 1970s, computer-generated imagery (CGI) has transformed the motion-picture industry, particularly the making of animated, fantasy, and science-fiction movies. During the subsequent forty years, CGI improved so rapidly that the major films that used it during that time now seem almost as old-fashioned as the process shot. (A process shot is made of action in front of a rear-projection screen that has on it still or moving images for the background.) Yet certain achievements are memorable for innovations that are landmarks in the development of CGI. Stanley Kubrick’s *2001: A Space Odyssey* (1968; special-effects designer and director: Kubrick; supervisors: Wally Veevers, Douglas Trumbull, Con Pederson, and Tom Howard; cinematographer: Geoffrey Unsworth) was the first film to seamlessly link footage shot by the camera with that prepared by the computer, and now some four decades later, its look continues to amaze audiences. Indeed, it set a standard of technical sophistication, visual elegance, integration with the story, and power to create meaning that remains unsurpassed.

Other CGI landmarks include Steven Lisberger’s *TRON* (1982; cinematographer: Bruce Logan), which, through comparatively simple
Modern special effects The special effects in Stanley Kubrick's 2001: A Space Odyssey (1968; special-effects designer: Kubrick; supervisors: Wally Veevers, Douglas Trumbull, Con Pederson, and Tom Howard; cinematographer: Geoffrey Unsworth) took up more than 60 percent of the movie’s production budget and required nearly eighteen months to complete. These SPFX, representing the state of the art at the time, add to the movie’s cinematic beauty and philosophical depth. Early in the movie, Dr. Heywood R. Floyd, an American scientist, is dispatched via shuttle to Clavius, a U.S. base on the moon, to investigate reports of unusual happenings there. Here we see a pod, launched from the shuttle, as it approaches its final landing via a platform moving down a red-lit shaft into the base’s quarters. Douglas Trumbull, whose technological contributions to the art of the movies were acknowledged by a special Oscar in 2012, was also responsible for the astonishing effects in Steven Spielberg’s Close Encounters of the Third Kind (1977), Ridley Scott’s Blade Runner (1982), and Terence Malick’s The Tree of Life (2011).

SPFX, transports a computer hacker inside a computer; the Star Wars trilogy, consisting of Star Wars (1977; director: George Lucas; cinematographer: Gilbert Taylor), The Empire Strikes Back (1980; director: Irvin Kershner; cinematographer: Peter Suschitzky), and Return of the Jedi (1983; director: Richard Marquand; cinematographer: Alan Hume); Barry Levinson’s Young Sherlock Holmes (1985; cinematographers: Stephen Goldblatt and Stephen Smith), which, in the “Glass Man” sequence, created a new standard for image resolution by laser-scanning the image directly onto the film stock; and James Cameron’s The Abyss (1989; cinematographer: Mikael Salomon), which won the 1989 Oscar for Best Visual Effects, marking Hollywood’s official embrace of the new technologies. Cameron’s other movies, including Terminator 2: Judgment Day (1991; cinematographer: Adam Greenberg) and Titanic (1997; cinematographer: Russell Carpenter) were equally innovative.

In 1993, Steven Spielberg’s Jurassic Park (cinematographer: Dean Cundey) became an instant classic with its believable computer-generated dinosaurs, and Cundey’s work on Brad Silberling’s Casper (1995) introduced the first computer-generated lead and talking figure. In 1988, Robert Zemeckis’s Who Framed Roger Rabbit (cinematographer: Dean Cundey) combined computer-generated imagery with actual settings and characters, so cartoon-like images entered the real world. Zemeckis reversed that pattern in Forrest Gump (1994; cinematographer: Don Burgess) by using CGI to insert footage of Gump (Tom Hanks) into real footage of Presidents Richard Nixon and Lyndon Johnson and former Beatle John Lennon.

In the last ten years, the major CGI achievements have been even more astonishing. Andy and Lana
A wholly convincing cyber-character  The character of Davy Jones (Bill Nighy, center) flanked by his equally frightening shipmates, made its debut in Gore Verbinski's *Pirates of the Caribbean: Dead Man's Chest* (2006; visual effects: John Knoll, Hal Hickel, Charles Gibson, and Allen Hall). A creation of the most advanced special effects—including 3-D computer-generated imagery and motion capture technology—he is a wholly convincing cyber-character, both human and inhuman. Jones, a physically and morally hideous creature, uses his many supernatural powers to inflict cruelty on virtually everyone with whom he comes in contact. His head resembles an octopus, with long tentacles forming a “beard”; he lacks a nose, breathing through a tentacle on the left side of his face, and has surprisingly blue eyes. He appears again in the third film of the *Pirates of the Caribbean* series, Verbinski’s *At World’s End* (2007), in which he is killed.

Wachowski’s *The Matrix* (1999; cinematographer: Bill Pope) used still cameras to photograph actors in flight from all angles and then digitized them into moving images to replicate what might have been a shot from a moving camera if any moving camera were capable of such complex work. The sequels—*The Matrix Reloaded* and *The Matrix Revolutions* (both 2003), also directed by the Wachowskis and photographed by Bill Pope—continued to introduce new CGI techniques. In this new world, movies are more likely to be set in wholly imaginary places such as those depicted in Peter Jackson’s *Lord of the Rings* trilogy (2001–3; cinematographer: Andrew Lesnie). So it was refreshing to see CGI used to recreate ancient Rome in Ridley Scott’s *Gladiator* (2000; cinematographer: John Mathieson).

Much of the research and development that makes so many of these movies possible comes from George Lucas’s special-effects company Industrial Light & Magic, where the visual-effects supervisor, Stefan Fangmeier, was behind the technology that made possible some of the movies mentioned here—including *Terminator 2: Judgment Day* (1991) and *Casper* (1995)—as well as the impressive historical re-creation of the world of the eighteenth-century British navy in Peter Weir’s *Master and Commander: The Far Side of the World* (2003; cinematographer: Russell Boyd). With the increasing complexity of CGI and the investment in human and technical resources required for its production, independent companies—whose artists and technicians usually work in consultation with the director, production designer, and director of photography—have become increasingly responsible for creating these effects. This artistry, now virtually a separate industry within the film industry, is expensive, but it has achieved astonishingly realistic effects at costs acceptable to producers. In addition to Industrial Light & Magic, other principal CGI firms are Pixar Animation Studios (now a part of Walt Disney), Blue Sky Studios (Fox), and Pacific Data Images (Dream Works SKG).

Motion capture (also known as motion tracking or mocap) is a specific CGI effect in which a live-
action subject wears a bodysuit fitted with reflective markers that allows a computer to record each movement as digital images; this is then translated, with as much manipulation as desired, into models on which the screen figures are based. When the images include facial contours and expressions, the process is called *performance capture*. These techniques are used to create virtual reality in animated, experimental, and feature movies, as well as in video games. Hironobu Sakaguchi and Moto Sakakibara’s *Final Fantasy: The Spirits Within* (2001; cinematographer: Sakakibara), the first major motion picture to use the technique to generate all of its “cast,” broke new ground in the world of special effects by featuring characters that—while convincingly human in features and motions—were entirely computer-generated. Other movies followed, including Peter Jackson’s *Lord of the Rings* trilogy (2001–3; cinematographer: Andrew Lesnie), in which the character of Gollum was created by motion capture; Robert Zemeckis’s *The Polar Express* (2004; cinematographers: Don Burgess and Robert Presley); and *Beowulf* (2007; cinematographer: Robert Presley). Motion capture and performance capture, as well as *rotscoping*—another version of motion and performance capture in which animators trace over live-action film movement for use in animated sequences—constitute a provocative sign of what might happen to the design and production of movies in years to come.

Director David Fincher’s *The Curious Case of Benjamin Button* (2008; cinematographer: Claudio Miranda) raises another issue related to motion and performance capture: actors’ credits. The story is about a man who is born old and grows younger, and Brad Pitt, who plays the lead character, insisted on appearing as Button from old age to infancy. Since the handsome actor is relatively young, Fincher relied on electronic special effects to create the illusion of Button’s reverse aging. To accomplish this, Fincher first photographed every facial expression of which Pitt was capable. This provided the base from which 150 visual artists created images reflecting the decrease in Button’s aging (i.e., skin and hair) over the years. Second, Fincher photographed a group of “body actors”—actors whose bodies substitute for the credited actor—playing the younger and older Button. Images of Pitt’s digitally altered face were then electronically inserted onto those body images to create the finished product. We know that many artists worked in the service of this single actor.character and that Pitt and six other actors actually played Benjamin Button. We also recognize that acting involves both facial expressions and physical movements, but the complex process used here raises a question: who deserves the credit for creating the character of Benjamin Button? While all seven actors are listed in the movie’s credits, only Pitt was nominated for an Academy Award for Best Actor in a Leading Role. But the “actor” in this case is an electronic compilation.

Wherever special effects take movie production in the future, there is the ever-present danger that all the SPFX in action, adventure, and science-fiction films will dazzle us but do little to increase our understanding of the world we live in or the drama of human life.