1

PSYCHOCINEMATICS: ISSUES AND DIRECTIONS

Arthur P. Shimamura

In the opening scene of The Graduate, Benjamin Braddock (Dustin Hoffman) exits a plane and enters the terminal at the LA International Airport. When he steps onto a moving walkway, the camera begins to track alongside at the same pace, which keeps Benjamin's position fixed and isolated to the far right of an otherwise empty screen (Figure 1.1). The opening credits begin to fill the space as we listen to The Sounds of Silence, Simon and Garfunkel's anthem to social alienation. Over the soundtrack, a voice from an airport loudspeaker requests: “Please hold onto the handrail and stand to the right. If you wish to pass, please do so on the left.” This beginning sequence anticipates the entire movie, which tells a story of a newly minted college graduate entering adulthood without any sense of purpose or direction. Benjamin is moving though he doesn’t appear to be going anywhere.

Filmmakers have developed techniques, largely through trial and error, that drive our sensations, thoughts, and feelings. Through acting, staging, sound, camera movements, and editing, movies develop a storyline, or what scholars call a narrative, that fully engages us. How do filmmakers heighten our sensations and direct our attention so that the drama keeps us riveted to the screen? How do techniques link events in an often seamless manner? How do movies drive our emotions, instilling suspense, laughter, horror, sadness, and surprise along the way? Philosophers, film theorists, psychologists, and recently brain scientists have considered our movie experience, as, of course, have filmmakers themselves. Why are movies so compelling?

Even at its early beginnings, scholars have considered the nature of our movie experience and its impact on society and culture (see Lindsay, 1915; Munsterberg, 1916). Over nearly a century, volumes of scholarly pages have addressed essential features of our movie experience, such as the way movies present a “realistic” view of the world or the way we connect with the characters portrayed. Commonplace now are university departments of Film Studies or Media that offer worthy intellectual analyses of such issues. Some film theorists have advocated a psychological or cognitive approach to movies (Bordwell, 1989; Carroll, 2008; Currie, 1995) as they are particularly interested in what goes on in the mind (and brain) of
Psychocinematics

the moviegoer. Until recently, however, only a few scientists have considered our movie experience as a topic of empirical investigation. The contributors of this volume—which include film theorists, philosophers, psychologists, and neuroscientists—explore the viability of a scientific approach to our movie experience or what I call psychocinematics.

What Is Psychocinematics?

As the term implies, psychocinematics seeks to understand the psychological underpinnings of this unique and popular form of entertainment. What sets this venture apart from other ways of understanding movies is its reliance on empirical research. That is, from experimental investigations the viewer’s experience is analyzed through objective, systematic, and replicable measurements. Such investigations cannot address all aspects of “film studies,” particularly those that pertain to societal ramifications. Yet we experience movies, and thus it is vitally important to understand as precisely as possible how we engage ourselves mentally as we watch them. With the advent of brain imaging techniques, particularly functional magnetic resonance imaging (fMRI), psychological science can now link mental events with brain processes. Indeed, it is now possible to have individuals watch a movie in an fMRI scanner and record the brain regions that are active during the experience. In this way, psychocinematics can connect minds, brains, and experiences as we watch movies.

Psychocinematics is grounded on a scientific analysis of our aesthetic response to movies. What exactly is aesthetics has been bandied about for centuries, primarily by philosophers, though recently scientists have taken part in this discussion (see Shimamura & Palmer, 2012). In essence, aesthetics can be viewed as a hedonic response, which is simply a preference or liking judgment. After a movie, as the closing credits scroll, we often elicit a hedonic response, such as “I liked it” or “That was terrible.” This judgment can be graded from very positive to very negative or from very interesting to very dull. We might even be able to articulate the basis on which this aesthetic response was made, such as having a satisfying ending or not being able to identify with the protagonist. Our aesthetic response may be based on the visuals, the action, or how a movie makes us think or feel. A primary goal of psychocinematics is to offer a scientific approach to the aesthetics of movies (see Table 1.1).
Psychocinematics: Issues and Directions

Psychocinematics could have been established very early on had the scholarly world been ready for Hugo Munsterberg’s *The Photoplay: A Psychological Study*, which was originally published in 1916. Munsterberg was an established leader in applied psychology, having published influential papers on the role of psychology in law, education, and business. In *The Photoplay*, he considered a cognitive approach to movies by suggesting that the art of film is in depicting our mental states rather than reproducing reality. He wrote:

… the photoplay tells us the human story by overcoming the forms of the outer world, namely, space, time, and causality, and by adjusting the events to the forms of the inner world, namely attention, memory, imagination, and emotion.

(Munsterberg, 1916, p. 173, italics his)

For Munsterberg, movies work because they model or simulate mental states: A close-up shot is akin to focusing our attention; a flashback mimics remembering; soft focus connotes a feeling. From this view, Munsterberg argued for a psychological analysis of how movies impinge on our perception, imagination, and emotion. He thus formulated the conceptual basis for a research program in psychocinematics. His ideas, however, were largely ignored for over 50 years. This negligence was due to several factors. First, Munsterberg died less than a year after the book was published. Second, mainstream American psychology at that time was in the throes of behaviorism such that any consideration of mental states was viewed as unscientific. Third, he was an outspoken German sympathizer during World War I, which antagonized many Americans. When his book was republished in 1970, the time was more conducive for his prescient views to be appreciated by those interested in film theory (see Munsterberg, 2001).

With current advances in cognitive and brain sciences, the time is ripe for worthy empirical investigations of our movie experience. Digital technology has made it easier to control and manipulate movie stimuli. When used as psychological stimuli, movies can help us better understand how we perceive, interpret, and respond to events. Indeed, movies offer a more natural way of presenting events, especially compared to typical stimuli used in psychological studies (e.g., pictures or words). When events are presented as movies, the psychological scientist can study mental processes dynamically as they unfold in time.

It is acknowledged that a full understanding of our movie experience requires collaboration among scientists and nonscientists. Philosophers and film theorists have thought deeply

---

**Table 1.1**

What Is Psychocinematics?

- Considers the psychological and biological underpinnings of our movie experience
- Addresses the aesthetic nature of movies from an empirical approach
- Develops movies for psychological research as a means of understanding cognitive processes as they unfold dynamically in time
- Encourages a multidisciplinary approach that includes psychology, cognitive science, neuroscience, philosophy, film studies, filmmaking, art history, sociology, and other related endeavors
about our experience with movies, as, of course, have filmmakers themselves. A thorough understanding of the psychological underpinnings of our movie experience will depend on worthy interactions among scientists, philosophers, filmmakers, historians, sociologists, and others that can help motivate a psychocinematic approach.

Making Movies

What exactly is a movie? Why do people make movies? These are the kinds of questions that appear simple at first but upon further consideration can be quite controversial. As our intent is to address the viewer’s experience, we can sidestep these issues and simply refer to our everyday usage of “movies” as moving pictures that many of us watch for enjoyment, interest, and entertainment. We will thus err on the side of inclusion by considering the variety of moving images we experience daily, such as those viewed in theaters (e.g., Hollywood features), on television (e.g., sit-coms), and on the Internet (e.g., YouTube videos). Most film scholars make distinctions between terms such as movies, film, cinema, video, and motion pictures. For the sake of simplicity, these terms will often be used interchangeably in this volume or will be defined specifically within chapters (for deeper conceptualizations, see Carroll, 2008; Mast, 1984; Perkins, 1974).

As we have dispensed with the philosophical issue of what exactly defines a movie, we will accept the fact that not all movies share all of the features that we will consider (indeed, there are movies that don’t move, such as Chris Marker’s La Jetée, which is composed almost entirely of a succession of still photographs). Also, within the realm of avant-garde or experimental cinema, some movies don’t profess to tell a story and instead may offer a commentary on the art form itself. We will acknowledge these exceptions, not necessarily excluding them in our analyses, but we consider the core interest of psychocinematics to be the understanding of our most common movie experience, which is the viewing of fictional narratives as portrayed by moving images (aka “movies”). Such viewings are, of course, best represented by commercial feature films, and we will consider them as prototypical examples as we encounter the ideas offered in this volume.

SETTING THE STAGE

As unique as movies are as an art form or means of entertainment, they evolved from earlier traditions, most notably storytelling, theater, and photography. We may not be fully aware of these influences as we watch a movie, yet our analysis of psychocinematics would be significantly diminished if we ignored these roots. Storytelling is its earliest influence, as the central intent of most movies is the telling of a story (for deeper analysis, see Currie, 2012; Robinson, 2005). Certainly with respect to Hollywood movies, it is the story and how that story is told that forms the backbone of our movie experience. We relish a good plot and when someone tells a story we use our imagination to conjure up our own private movie of the narrative.

Homer’s ancient tales of the Iliad and Odyssey—epic stories of warfare and ships at sea—were the Star Wars of their time. Such narratives, characterized as myths, fables, and legends, convey a culture’s knowledge, morality, and politics by way of a rich oral tradition. Since the advent of
printed material, we have the means of reading stories to ourselves. What makes a good story? Aristotle in *The Poetics* suggested that a well-formed plot should be encapsulated as a complete tale with a beginning, middle, and end. Characters must be developed through recognition or realization (e.g., Luke Skywalker realizing that Darth Vader is his father). There should be surprises and reversals of fortune along the way. Movies, of course, are grounded in storytelling as they follow Aristotle’s guidelines for plot formation and structure. Also, many of the familiar movie genres come from literature, such as epic, romance, comedy, Western, mystery, science fiction, and horror.

Theater offered the second artistic route to movies. In Greek dramas performed in Athens 2,500 years ago, in Shakespearean plays performed in London 400 years ago, and today as performed in countless cities, people have enjoyed stories as presented by actors performing on stage. Whereas storytelling relies on the listener (or reader) to imagine the actions of the characters portrayed, theater actually presents the actions. Also, theater provided some of the essential ingredients for making a movie, including a script, set direction, actors, and stage design. Indeed, when movies were first shown, a common term for this new art form was *photoplay*, suggesting that movies were viewed as plays recorded on film. Movies are, of course, much more than that as the ability to move the camera and change the sequence of shots through editing has made movies a unique art form (Dymtryk, 1986; Murch, 2001). Yet it is easy to see why the term was applied as people go to both to watch a drama unfold through the performance of actors.

It is the ability of actors to transcend us outside of our current environment that makes for good theater (see Goldstein & Bloom, 2011). The illusion of naturalness in movement and dialogue and the ability to express both subtle and grand emotions are hallmarks of a fine performance. Many film actors come with stage training, though, of course, there are differences between the way one performs in front of an audience and the way one performs in front of a camera. Yet the ability to convey lines with a natural sincerity and to move without appearing overly histrionic is an essential feature that enhances both a staged performance and one on film. Thus, many of the rules and techniques of theater acting are relevant to movie acting.

The visual makeup of a staged play, or what scholars often call the *mise-en-scène* (*placing on stage*), has been co-opted and applied to movie sets. A movie’s visual aesthetics is based on lighting, object placement, scenery, and the actors’ movements, all of which have been influenced by theatrical performances. Also, the duties of the film director and set designer have their roots in theater, though again there are differences in what they do in the theater compared to a movie production. Nevertheless, the visual style of a movie, what even film scholars call the *mise-en-scène*, has its foundation in theater. Of course, with movies, particularly in the digital age of computed-generated imagery (CGI), there is immense freedom in how the *mise-en-scène* is arranged.

Without the advent of photography, the third essential route to movies, it is unclear how moving pictures would even have been invented. Movies are simply still images presented rapidly in sequence, and prior to the digital revolution, the primary method of creating such images was through chemical-based photography. Thus, all of the advantages and limitations of photography are inherent in the creation and aesthetic appeal of movies. Creative photography offered a basis for frame composition and dramatic lighting. Unlike theater, the
photographic image could depict a close-up or present an unusual point of view, such as from high above or down below. The filmmaker could add stark contrasts of light and dark as was used in German expressionist films, such as F. W. Murnau’s *Nosferatu* (1922), and later in American film noir. Early on, limitations in the process of photography hampered filmmaking. Movie cameras were bulky and difficult to move. Film emulsions were limited in their sensitivity, and bright lights were often required to obtain good images. Care had to be taken to ensure contrasts in light and dark as different color frequencies seen by the eye can appear equally gray on black-and-white film. Thus, the aesthetic appeal of a shot depended largely on the application of photographic techniques to enhance the creative vision of the director and cinematographer.

Eadweard Muybridge, sometimes considered the “father of motion pictures” (Hendricks, 1975), photographed animals in motion and invented an early motion picture projector (see Shimamura, 2002; Solnit, 2004). Muybridge was commissioned by Leland Stanford, the railroad magnate and former governor of California, to demonstrate that a trotting horse had all four legs off the ground at some point in its gait. He placed cameras along a racetrack and strung threads across the track, attaching each one to a shutter so that when the horse trotted along the track it pulled the threads, snapping pictures in succession. Muybridge proved that a trotting horse did indeed have all four legs off the ground at one moment in its gait. Moreover, when these images were shown quickly in succession, the animals appeared to move, thus paving the way for the creation of motion pictures (see Rossell, 1998).

**MOVING IMAGES**

The commercial breakthrough in movies as a form of entertainment came with Thomas Edison’s *Kinetoscope* and the Lumière brothers’ *Cinématographe*. These inventions created a stir during the mid-1890s as people flocked to watch moving images. The Lumière brothers had their first public showing in Paris on December 28, 1895, at which 33 people paid 1 franc to watch 10 short clips, including their first film, *La Sortie de l’Usine Lumiè re à Lyon*, which simply showed workers exiting their factory in Lyon (this and other early silent films can be viewed at http://www.YouTube.com). Each movie was hand-cranked by an operator and lasted no more than 50 seconds. One clip presented a fictional narrative, *L’Arroseur arrosé* (*The Sprinkler Sprinkled*), in which a boy sneaks behind a man watering with a garden hose and steps on the hose to prevent the flow. When the man looks at the hose to see what’s wrong, the boy releases his foot and the man’s face is sprayed ... and movie comedy is created.

Moving images are created by the rapid succession of still photographs (or frames). The on-and-off (i.e., *flicker*) rate must be fast enough so that we do not perceive any change in illumination between frames. With the *Cinématographe*, the flicker rate was rather slow, less than 16 frames per second, such that a noticeable flashing or flickering was perceived (hence the term *flicks* to refer to these early movies). As movie technology advanced, the perception of flicker was abolished with the use of a propellerlike shutter that spun rapidly in front of the lens of a movie projector so that a movie running at 24 frames per second would actually present each frame two or three times, thus increasing the flicker rate to 48 or 72 Hz (cycles per second). Even at these speeds, if we could accurately measure the light projected onto the screen, there would still be a flicker. We do not perceive the flicker because there is a lingering trace of the visual image that is maintained briefly by sensory neurons (a visual echo, if you
This phenomenon is easy to demonstrate with a flashlight or laser pointer. If you turn the light on you’ll see a point, but when you move the light around very quickly you’ll see a trailing line. That trail of light is the lingering trace, which, of course, is all in your head. Digital displays rely on the same perceptual processes, though they are presented differently (see Chapter 6).

It is, however, not the phenomenon of visual persistence that gives us the perception of moving images, though many have believed it to be so (for a discussion of this issue, see Anderson & Anderson, 1993). The “illusion” of seeing movement from the rapid succession of still images, or what psychologists call apparent motion, is based on a not completely understood set of processes that was studied by Max Wertheimer, the German Gestalt psychologist (Wertheimer, 1912). Wertheimer conducted experiments in which a vertical line is followed by a horizontal line at various lag times between presentations. If the lag time (interstimulus interval) was very fast (less than 30 ms), then the viewer perceived two simultaneously presented lines that appeared to form a right angle. In this case, visual persistence of the first line overlapped with the presentation of the second line so that the two were perceived as being presented simultaneously. If the interstimulus interval was very long (greater than 200 ms), then the viewer simply saw two lines being presented sequentially. However, between these two intervals, there was a range of lags when the viewer actually perceived the vertical line appear to move and swing down to a horizontal position. The perceptual mechanisms underlying this apparent motion are multifaceted and today still studied by psychologists and neuroscientists (see Deco & Roland, 2010).

In making a movie, we start with the shot, the sequence of frames taken continuously from a camera. Very early movies, such as those shown by the Lumière brothers, were single shots taken by a stationary camera. These days, shots can include camera movements, such as tracking (moving the entire camera with the action), panning (rotating the camera head to the left or right), or tilting (rotating the camera head up or down), as well as variable focus shots that zoom in or out of a scene. The history of movies is marked by creative applications of camera placement and movement intended to carry the narrative along in dramatic ways (for a fuller presentation of these issues, see Bordwell, Staiger, & Thompson, 1985; Cook, 2004).

Editing involves the joining of sequential shots, with each individual joint called an edit. The most basic edit is the direct joining of two shots, often referred to as a direct cut or simply a cut. Other shot transitions include the dissolve, in which the ending of the first shot fades out while the next one fades in as an overlapping double exposure. This transition is used to indicate that some time has elapsed between shots. The fade to black is a fuller dissolve such that for a perceptible moment the screen is completely black before the next shot fades in. This transition is used to suggest that an even greater amount of time has elapsed compared to a dissolve. The wipe is a classic silent era transition in which a noticeable line moves across the shot and acts as a border between the shots, as if the next scene is wiping over the previous one. Dissolves and fades are less used in contemporary movies, and wipes are almost never used, except to make stylistic reference to an older way of editing (George Lucas used wipe edits in Star Wars: Episode IV—A New Hope as a way of making reference to earlier science fiction movies).

Other editing techniques include cross-cutting, eyeline matches, match-action edits, and shot/reverse shots. In cross-cutting or parallel editing, shots move between two different events to show that they are occurring at the same time. Cross-cutting, especially when
Psychocinematics

scenes alternate several times, enhances the dramatic feel of the narrative as it moves along. *Eyeline matches* are shot sequences in which a character glances somewhere off-screen, and the next shot shows the object of fixation. In a *match-action* edit, a shot transition occurs while a character is in midmovement, such as a shot that begins with a person reaching for the door and cutting to a close-up of a hand grabbing the doorknob. *Shot/reverse shots* are very common during dialogues. It often involves successive “over-the-shoulder” shots. For example, when filming a couple engaged in a conversation, a sequence might first show the man talking with the camera positioned over the shoulder of the woman. When the woman responds, a cut moves to a reverse angle shot that shows the woman viewed over the shoulder of the man. All of these editing techniques drive the narrative and help create seamless edits.

In 1927, sound made its way into movie production with *The Jazz Singer*, a mostly silent movie but one that included synchronized dialogue and singing. Sounds are classified in two ways. *Diegetic* sounds refer to ones that are part of the scene, such as conversations, footsteps, and clinking glasses. *Nondiegetic* sounds are not part of the scene, such as a musical soundtrack or the voice of a narrator. The application of both diegetic and nondiegetic sounds offered a rich, new arsenal of expressive tools for the filmmaker. Indeed, the way we integrate visual and auditory sensations as we watch movies is what makes them a particularly forceful means of presenting a story.

CONTINUITY EDITING

From the creativity of early filmmakers, Hollywood studios codified a set of rules for narrative structure that first depended on scriptwriters conforming to Aristotle’s story arc—that is, delineating a beginning, middle, and end, and offering surprises and reversals of fortune along the way. The studios then relied on directors, cinematographers, and editors to create an audiovisual experience that presented the narrative without confusing the moviegoer. This “Hollywood style” guaranteed a smooth temporal flow of events with a set of “continuity” rules that made edits appear as seamless, virtually invisible shot transitions. These rules began with the application of standard editing practices, such as cross-cutting, eyeline matches, match-action edits, and shot/reverse shots.

Consider Alfred Hitchcock’s *Rope* (1948), which runs as if it were filmed as a single shot. As such, the duration of time enacted is identical to the time spent watching. Also, for such a movie the spatial setting is limited as to where a camera could be moved during that time interval. Editing with cuts gives filmmakers a way of introducing lapses in time and changes in spatial setting that flow smoothly. Interestingly, cutting also increases the perceived activity, speed, and enjoyment of a filmed sequence (Kraft, 1986). To create shot transitions with a smooth flow, it is necessary to set up a spatiotemporal context for the viewer. For example, a scene often begins with an *establishing shot*, which is a long (wide-angle) shot that sets the “stage” or spatial context of a scene. One rule of continuity editing is to include an establishing shot every time the narrative shifts to a different spatial setting.

1 *Rope* was actually filmed using 10 shots lasting roughly 10 minutes each, though the transitions between these shots are hardly noticeable as each continues the sequence in real time.
Once a spatial reference frame has been established, that perspective must be maintained as shots move to closer views. Consider an establishing shot that shows a family seated around a dining room table. Imagine the father on the left about to carve a roast, and the mother on the right seated and passing a bowl of mashed potatoes to her daughter on her right who is facing us. The establishing shot sets a visual perspective that defines the position from which we voyeuristically view the event. We maintain this spatial reference across shots as if creating an imaginary stage that defines the right–left axis of action. Filmmakers follow a 180-degree rule, which states that after an establishing shot sets the axis of action, a camera can only be positioned in front of that line. A camera shot that violates the 180-degree rule disrupts the moviegoer’s sense of space. For example, imagine a set of close-up shots between the father and mother as they converse with each other. If we follow the 180-degree rule, a close-up shot of the father would have his profile facing the right, as if looking at the mother. When the mother speaks, we might be presented with a close-up shot of her facing to the left. These views maintain our spatial representation as defined by the establishing shot (e.g., the father is on the left and the mother is on the right). If the camera were to be positioned behind the daughter, thus crossing the axis of action and violating the 180-degree rule, a close-up shot of the mother from that angle would show her facing to the right. Given our frame of reference, it would appear as if she is talking to someone behind her and facing away from the father. This change in perspective would be tantamount to suddenly viewing a theatrical play from backstage, as things that were on the left would now be on the right.

From trial and error, filmmakers have learned to create a natural feel of movement across edits. Another continuity rule is the 30-degree rule, which states that successive shots should always be angled more than 30 degrees apart. This seemingly odd rule is made apparent as soon as one sees a violation of it. Consider the worst-case scenario in which there is no change in the camera angle: For example, after taking a medium shot of our father, we turn off the camera, move directly toward him, and shoot from this closer position. If we were to edit these two shots together, the father would suddenly appear to have expanded or to have suddenly jumped toward the camera. That is, what we would see is apparent motion because the only change in the image across the edit would be the scale of objects (i.e., everything just gets bigger). Our brain interprets this change, which is called optical expansion, as a very quick movement toward us or a sudden change in the size of objects, as either of these two possibilities would be the case if this sequence occurred in real life. These jumps in movement tend to occur if successive camera shots are angled less than 30 degrees apart from each other. Violations of this rule are called jump cuts, which are noticeable as odd jerky movements or shifts of objects in a scene. These days, jump cuts are actually used as a stylistic effect often to express erratic or energetic action.

Continuity editing rules help to maintain a smooth narrative flow. Indeed, the mark of an outstanding film editor is someone whose technique is so fine that edits are not even noticed. (How many Academy Award–winning editors do you know?) Of course, all rules are meant to be broken, particularly with respect to art and aesthetics, and during the 1960s, a style of filming emerged in which it was acceptable, indeed, trendy, to make viewers aware of camera movements and editing. Some of these techniques, such as jump cuts and shaky cameras, were originated by avant-garde filmmakers, such as Jean-Luc Goddard and Francois Truffaut, and then made their way into Hollywood features. Others, such as a more varied use of camera movements, angles, and zooms, came from the style of innovative feature directors, such as Alfred Hitchcock, Stanley Kubrick, and Martin Scorsese.
The biggest trend in movie making since the 1960s has been the incredible increase in the number of edits in a movie (see Chapter 7). Prior to 1960, a Hollywood movie would include 300 to 700 shots, which for a 110-minute movie would amount to an average shot length (ASL) of 22 to 9 seconds (see Bordwell, 2002). During the 1960s, many movies were produced with an ASL of 4 or 5 seconds, which would put the number of shots to over 1,000. These days an action movie may include over 2,000 shots. In the James Bond movie *Casino Royale* (2006), an edit occurred on average every 2.2 seconds! Some have suggested that the introduction of MTV music videos (not to mention *Sesame Street*) have created a generation accustomed to rapid editing. Whatever the sociological forces of this cultural change, the increase in the number of edits in a movie over the decades is well documented.

David Bordwell (2002, 2006) has described Hollywood movies since the 1960s as adopting *intensified continuity* editing, an apt term as basic continuity rules are still applied, only now camera movements and editing have been amplified. Bordwell identified four properties of intensified continuity: (1) rapid editing, (2) extremes of lens lengths (i.e., wider wide angles, more telescopic telephotos), (3) closer framing during dialogues, and (4) free-range camera movements (e.g., weaving quickly through a crowd). With such changes, both actors and cinematographers have had to adjust. For example, with respect to closer shots during dialogues, Bordwell states: “Mouths, brows, and eyes become the principal sources of information and emotion, and actors must scale their performances across varying degrees of intimate framings” (Bordwell, 2002, p. 20). Intensified continuity has influenced the aesthetics of experiencing movies. In my recent freshman seminar on the psychology of movies, some students felt that movies from the 1940s and 1950s were paced too slowly for their liking.

**Empirical Foundations**

Through careful experiments, science offers a way of understanding the regularities of our world, including the inner world of our brains. There are great theorists, such as Albert Einstein, who never conducted a single experiment, yet they conceptualized the world in new ways that could be tested and evaluated by others. Some theorists, such as Sigmund Freud, have influenced many, though it is questionable to consider Freud’s framework as a *scientific* theory as it is difficult if not impossible to test empirically. Psychocinematics is grounded on experimental investigations that address the way mental processes are engaged during our movie experience. To identify and characterize such processes, we must turn to psychological and biological science and consider the way the mind/brain interprets sensory information.

**PSYCHOLOGICAL SCIENCE**

In the 1860s, scientists such as Gustav Fechner and Hermann von Helmholtz developed an empirical approach to perception and with it initiated *psychological* science. Fechner called this new science *psychophysics*, thus characterizing the way the mind interprets physical stimuli (Fechner, 1860). He approached the study of visual perception much like the way an engineer might try to understand the optics of a camera. For example, he studied the smallest amount of light that one could detect or the ability to perceive different colors. Helmholtz
studied both vision and audition and, like Fechner, conducted behavioral experiments to determine the limits and quality of sensory processes. He developed important theories concerning the way we perceive color, spatial depth, and motion.

Interestingly, both of these early psychological scientists had interests in aesthetics. In 1876, Fechner published *Vorschule der Aesthetik* (*Primer of Aesthetics*), in which he used his psychophysical approach to study hedonic judgments. He showed individuals various colors or shapes, such as rectangles of varying proportions, and asked them which ones they preferred. From these hedonic judgments, Fechner believed he could build an understanding of our aesthetic appreciation of art. Helmholtz also considered the way we appreciate paintings (Helmholtz, 1881), as well as the way music is enjoyed through tone combinations (Meulders, 2010).

Psychophysics offered a scientific method for studying perception by breaking it down into elemental features, such as color, shape, and motion. Others, such as Hermann Ebbinghaus (1884/1964) and Wilhelm Wundt (1874/1904), furthered this approach by considering the elements of human memory and emotion. One problem with these approaches was that the mind is not a physical entity like air or water. As a result, these psychologists made inferences about mental processes by studying behavior. In a highly influential paper entitled *Psychology as the Behaviorist Views It*, John Watson (1913) rejected the subjective notion of a mind: “Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior” (Watson, 1913, p. 158). He went on to state that psychological science must proceed without ever using such terms as consciousness, mental states, or mind. Behaviorism was grounded in an analysis of the elements of behavior rather than the elements of the mind. This approach became the mainstay of American psychological science for the next 50 years.

It was during the excitement of Watson’s behaviorism when Munsterberg wrote *The Photoplay: A Psychological Study* and encouraged a mindful, cognitive approach to the way we experience movies. No wonder his views were not well considered. Such terms as attention, imagination, and emotion were precisely the kind that Watson wanted to expunge from his brand of psychological science. Yet as a graduate student trained under Wundt, Munsterberg proceeded to describe how mental states are driven by movies.

Gestalt psychology was somewhat more successful as an alternative to behaviorism. Max Wertheimer, along with his two assistants, Kurt Koffka and Wolfgang Köhler, established this wholistic approach to perception by suggesting that a visual scene is perceived in its entirety and cannot be broken down into smaller elements. They argued that the perceptual world is ambiguous or illusory, and thus it is the way viewers organize or interpret a visual scene that determines how it is perceived. Rudolf Arnheim, who studied under Wertheimer, is known for his use of Gestalt principles to address the psychology of art. His wrote influential books on visual aesthetics (Arnheim, 1974, 1983), which described paintings with respect to the “perceptual forces” that artists impart through balance, harmony, and object placement.

Even before his analyses of the visual arts, Arnheim wrote *Film als Kunst* (*Film as Art*) (Arnheim, 2006, originally published in 1933), in which he attempted to justify film as an art form because it alters our views of the world and thus fails to render an exact copy of the real world. Similar to Munsterberg’s view, Arnheim considered dissolves, cross-cuts, and point-of-view editing as ways of creating an illusion of space and time that was different from the way we perceive real space and time. Arnheim was actually disgruntled by the advent of
Psychocinematics

sound in movies as it attempted to mimic more closely the real world (in later writings he even denigrated color and widescreen cinema). Arnheim offered a formalist view, which suggested that the way a movie is structured or formed is what makes it a work of art (Andrews, 1976). Unlike Munsterberg’s treatise, *Film als Kunst* was very influential among film scholars as a way of justifying film as art. Unfortunately, among psychological scientists, Arnheim’s Gestaltist interpretation did not lead to much empirical investigation.

**THE COGNITIVE REVOLUTION**

During the 1950s, the advent of the digital computer offered a new way to characterize psychological processes. Just as a computer receives inputs, stores information, performs computations, and outputs results, the mind could be viewed as a programmable device able to recognize objects, understand language, and remember events. Cognitive psychologists thus began to consider perceiving, remembering, thinking, and decision making from an “information processing” approach. By this view, the mind could be viewed as mental processes that were involved in various computational stages of processing, such as input, storage, and output. During the 1960s and 1970s, this approach became so pervasive across all domains of psychological science that this era has been referred to as the cognitive revolution.

Some cognitive psychologists developed actual computer programs that simulated human performance, whereas others used the computer analogy more loosely by keying on information processing terms, such as sensory input, short-term buffers, long-term memory, and response output. In 1967, Ulric Neisser’s *Cognitive Psychology* delineated the approach succinctly: “… the term ‘cognition’ refers to all the processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used” (Neisser, 1967, p. 4). In the 1980s, a multidisciplinary approach, described as cognitive science, emerged in which psychology was integrated with neuroscience, linguistics, artificial intelligence, philosophy, and anthropology as a way of developing a deeper understanding of human cognitive function (see Gardner, 1985; Norman, 1980).

The cognitive approach evolved as a reaction against behaviorism, as it acknowledged the importance of mental processes and representations. Previous “mentalistic” traditions, such as those espoused by Wundt, William James, and the Gestaltists, failed to develop a strong scientific approach because their mental concepts were too vague and the theories not described well enough to be tested adequately. In many respects the cognitive approach offered a middle ground as the study of behavior was still paramount, only it was now best explained by referring to the way “information” is processed. With computers as evidence, it was not outlandish to consider a physical entity that could be “programmed” to perceive, store, and perform complex calculations.

A particularly important feature of the cognitive approach is top-down processing, which refers to the use of knowledge (top) to direct sensory processes (bottom). Cognitive psychologists adopted the term schema, which Bartlett (1932) used to describe the way prior knowledge guides behavior. We are constantly applying schema to drive top-down processing. For example, we have a schema for what to do in a movie theater—which is to pay for a ticket, enter a darkened room, sit down, and enjoy a moving picture. Top-down processing is critical in the way we interpret sensory input. Ernst Gombrich, the noted art historian, was the first to consider top-down processing in our aesthetic experiences (Gombrich, 1960). He argued that paintings are symbolic and we use personal and cultural knowledge (i.e., “schemata”) to
form expectations about what to look for in an artwork. According to Gombrich, top-down processing is the beholder’s share in our art experience. That is, we bring to the art experience prior knowledge and expectations. Cognitive film theorists have considered Gombrich’s views with respect to our movie experience (see Chapters 2, 3, and 4). For example, Bordwell (1989, 1992) applied the notion of schema to our understanding of film narrative. Also, the notion of modes of receptions (see Chapter 16) suggests that we regulate our movie experience through top-down processing (e.g., expectations).

Despite the acceptance of mental states as appropriate scientific constructs, few cognitive studies were directed toward our experience with movies. A strong advocate for psychocinematics during the 1970s and 1980s was Julian Hochberg, a cognitive scientist who considered the perceptual features of movies (Hochberg, 1986; Hochberg & Brooks, 1978). In both theoretical and empirical analyses, Hochberg attempted to delineate the cognitive underpinning of our movie experience. He offered a constructionist approach in which we build a spatial representation of scenes and events as we watch movies.

COGNITIVE NEUROSCIENCE

Can the complexities of our movie experience be understood by examining brain mechanisms? Neuroscientists have studied the workings of the brain from many levels, including the study of individual brain cells (neurons) and the study of global activity in the human brain. Cognitive processes are driven primarily by the workings of our two cerebral hemispheres, those large convoluted masses that embody tens of billions of neurons, each having thousands of connections to others. Neural circuits have been identified that pertain to various mental processes, such as vision, memory, language, emotion, and motor control. Both structural (i.e., anatomical) and functional (i.e., physiological) analyses have been used to investigate the neural correlates of human cognitive function. Of course, the whole brain must work together to give us the ability to perform complex operations, such as perceiving, remembering, and decision making.

Figure 1.2 shows the lateral (outer) surface of the left cerebral cortex and medial (inner) surface of the right cerebral cortex. Initial input of visual information into the cortex occurs at the most posterior region of the occipital lobe, an area identified as V1. From this point, visual information is processed along two major paths. The dorsal or “where” path courses up through the parietal lobe and processes spatial information, whereas the ventral or “what” path courses down through the temporal lobe and processes object information. Auditory input arrives at Heschl’s gyrus (HG) situated in the temporal lobe. From there, audition is processed as identifiable sounds in surrounding temporal regions (Belin, Zatorre, Hoge, Evans, & Pike, 1999). As is well known, speech recognition and language are processed predominantly in the left hemisphere in most (roughly 90%) humans.

The anterior region of the frontal lobes is called the prefrontal cortex (PFC). It receives inputs from many other brain regions and sends projections back to these regions. In this way, the PFC has the capacity to coordinate and control cortical processing. In fact, patients with frontal lobe damage have particular problems in controlling their attention, thoughts, and feelings (Shimamura, 2008). They are distractible and in some cases have severe problems in regulating their emotions. Neuroimaging studies have confirmed the role of the PFC in what psychologists call executive control (Badre, 2008; D’Esposito, Postle, & Rypma, 2000; Shimamura, 2008). If one considers the cacophony of neural signals at any given moment, it
becomes obvious how important it is for us to have a mechanism that controls or modulates brain activity. The PFC’s role in monitoring and controlling neural activity forms the basis for top-down processing as it provides a feedback mechanism in which thoughts and expectations can guide and select sensory signals (see Miller & Cohen, 2001; Shimamura, 2008).

Advances in neuroscience have identified another important region called the posterior parietal cortex, which is situated between the ventral and dorsal visual paths and is also adjacent to regions that process speech and other sounds. This region acts as a convergence zone that binds or integrates multisensory information. The prefrontal cortex (PFC) acts as an executive modulating brain activity through feedback loops to posterior regions. The medial (inner) surface shows the orbitofrontal cortex (OBF) and the anterior cingulate cortex (ACC), which are involved in emotional monitoring and evaluation. Brain images reprinted with permission from Digital Anatomist Interactive Atlas, University of Washington, Seattle, WA, copyright 1997.
paintings rated as beautiful (Ishizu & Zeki, 2011; Kawabata & Zeki, 2004). While watching rather disturbing film clips (e.g., a surgical film showing an arm amputation operation), the OBF and ACC are engaged when subjects are instructed to suppress their emotions (Shimamura, Marian, & Haskins, 2012). Movies have an extraordinary capacity of engaging emotional processes and empathizing with characters. Thus, understanding the manner in which movies elicit emotions is another central goal for psychocinematics.

Since the 1990s, many cognitive scientists have turned to brain imaging as a way to map cognitive processes onto brain mechanisms. In particular, the advent of fMRI has allowed scientists to assess on a moment-to-moment basis brain activations in response to sensory stimuli. The technique uses the same MRI scanners found in hospitals, though they are tuned to detect subtle changes in blood flow, which occur when brain regions become active. At any given moment, however, there are tens of thousands of neurons active just to keep us alive, such as those involved in regulating heart rate, respiration, or body temperature. In fMRI analyses, these steady-state activations are cancelled out by comparing one set of activations with another. For example, one could scan individuals while they are watching a movie and again while they are viewing still photographs. By subtracting the “watching movie” scans from the “viewing photographs” scans, one can identify brain regions that are specifically active while viewing moving pictures (see Chapters 12 and 15 for further analyses of fMRI methods and findings).

How do our brains respond to movies? To explore this question, Hasson et al. (2008) advocated neurocinematics, in which brain activity is recorded while individuals watch moving pictures. Not only can such research offer intriguing findings about our movie experience, but they also can help elucidate the neural underpinnings of natural, everyday viewing (see Hasson, Nir, Levy, Fuhrmann, & Malach, 2004; Nishimoto et al., 2011). Yet merely recording brain activity while watching movies is not enough, as it is important to consider the psychological processes that are defined by such neural activity. That is, we cannot fall into a modern-day version of phrenology where bumps on the head are replaced by bright spots in the brain. We need to go further and develop neuropsychological theories that describe the functional dynamics of brain activity and how they operate in the service of cognition (see Shimamura, 2010).

In evolutionary terms, our survival depends on our ability to interpret the environment, such as acknowledging a catchable prey, a threatening predator, or a willing mate. In such heightened emotional situations, the brain engages a set of processes intended to arouse our mind and body, thus sparking the flight-or-fight response in which adrenalin courses through our body and induces heart palpitations, muscle twitches, butterflies in the stomach, and sweaty palms. Such physiological responses are intended to prepare us for intense physical activity and are initiated when we are frightened, excited, angry, or sexually aroused (see Sapolsky, 1994). The amygdala, a cluster of neurons tucked within the medial region of the temporal lobes, acts as an interface between cognitive and emotional processes (see LeDoux, 1998). The amygdala integrates inputs from many cortical regions, and when the environmental context is interpreted as an emotional situation (e.g., angry boss, willing mate), it sends signals to the hypothalamus, a subcortical structure, which initiates the adrenal arousal response. When we watch a movie and imagine arousing or fearful situations, our brains initiate these basic physiological responses.

In forming theories about brain function, scientists have viewed the brain much like a large business or corporation where various divisions proceed somewhat independently toward the goal of manufacturing a final product. Our eyes and ears gather raw materials
from the outside world in the form of bits of sensory information. These bits are processed and the final product is meaningful information, such as the recognition of a friend at your door or the word “hello” when greeted. Like an industrial conveyor belt, there are paths in the brain that process and build on sensory information along the way. From fMRI studies, it has been shown that the ventral path segregates the visual scene into recognizable objects (e.g., faces, chairs, and other objects; Haxby et al., 2001), whereas the dorsal path constructs a spatial layout or context into which objects are placed. Brain processes work in parallel but must be integrated to give us the ability to perform complex activities such as understanding events or social signals.

A Conceptual Framework for Psychocinematics

Movies are rather unique as they offer a sensory experience that is similar to natural viewing, yet they have been created for a particular purpose, which is to instill an aesthetic response. As described earlier, psychocinematics works within the framework of aesthetic science, as it is essential to examine the way movies drive our interest, understanding, and appeal (see Shimamura & Palmer, 2012). With regard to aesthetic experiences, I have proposed the I-SKE model, which identifies the importance of the artist's intention (I) to create an artwork and the beholder's share in terms of the way an artwork impinges on sensations (S), knowledge (K), and emotions (E), hence the I-SKE acronym (Shimamura, 2012). Figure 1.3 characterizes this framework with respect to the filmmaker, movie, and viewer.

The filmmaker's intention plays a role in our movie experience. As suggested by the so-called auteur theory of film criticism (Sarris, 1968), we often attribute the creative vision of a movie to a single artist, often the director, as when we say it's a Woody Allen or Quentin Tarantino film. Certain styles and techniques are associated with specific filmmakers, and knowledge of their intention to communicate a certain viewpoint, idea, or feeling is part of the viewer's experience. In cognitive terms, we develop a schema for certain filmmakers, and this knowledge can influence our viewing. As creative expressions, we expect certain things from movies that we don't expect from viewing nature. In particular, we acknowledge that a creator had the intention to instill in us an aesthetic experience, which may be to offer a sensory experience, a conceptual viewpoint, or a certain feeling. The I-SKE model offers a way to characterize these three psychological components of our movie experience—that is, the role of sensations, knowledge, and emotion in driving our aesthetic response to movies.

SENSORY AND ATTENTIONAL FEATURES

Our movie experience is, of course, driven by the sensory inputs that envelop and guide us. Through sights and sounds, the filmmaker creates a spatial environment, and quite often we engage ourselves as if we are part of the world portrayed. Yet even the earliest film theorists, such as Munsterberg (1916), acknowledged the fact that we do not really believe we are actually in the scene (see Chapters 3 and 6). As with our viewing of paintings or photographs, we can imagine ourselves being in or "seeing in" the picture, but at the same time we know that we are outside the medium standing in an art gallery or looking at an art book (see
Shimamura, in press; Wollheim, 1980; Chapter 6). Philosophers have thought deeply about this matter, as it is not completely clear to what extent we act as if we are perceiving or imagining ourselves in a picture or movie.

Psychocinematics can help address such issues. For example, there are brain regions that respond to both perceived and imagined experiences, as well as other brain regions that are only active when we are actually engaged in sensory processing (Kosslyn, Thompson, & Ganis, 2006). How much are sensory-specific regions engaged when we watch movies? To what extent do our brains interpret the sensory experience as being within the spatial environment portrayed by a movie? With respect to such questions, one could explore how editing rules, such as the 180-degree rule, create a spatial frame of reference (see Chapter 11). Does it take longer to adjust to a violation of the 180-degree rule as opposed to a shot that conforms to the rule? Why do cuts that adhere to the 30-degree rule seem to represent a movement in the viewer’s point of view rather than a movement of objects in the scene? Why are we so oblivious of the thousands of shot transitions that occur in a movie?

As mentioned earlier, one effective means of creating a seamless edit is the match-action edit, in which a character’s movement continues across a cut. To create a smooth match-action edit, film editors have advocated that the action after the edit be repeated or overlap with the pre-edit action by several frames (48–72 msec; see Anderson, 1998; Dymtryk, 1984). Shimamura, Cohn-Sheehy, and Shimamura (2012) confirmed this intuition by having participants determine the smoothest movement of a match-action edit across a varied amount of overlap (or jump) in the action between shots. Individuals judged the smoothest action to occur when there was a three-frame repeat of the action. In another study (Smith & Henderson, 2008), individuals watched excerpts from Hollywood movies and made a keypress whenever they detected an edit. Participants failed to detect an average of 15.8% of edits, exhibiting what the authors called “edit
blindness.” Match-action edits were most often missed as participants failed to detect a third of such edits.

Movement is a potent force in driving attention. We tend to pay attention to moving objects, particularly when we watch movies. Mital, Smith, Hill, and Henderson (2011) recorded eye movements while individuals watched movies. There was a strong coherence in gaze pattern among viewers as they all tended to fixate on the same moving objects. Smith (Chapter 9) refers to this gaze attraction as attentional synchrony, and has developed the Attentional Theory of Cinematic Continuity (AToCC) to describe its nature. Such findings are also consistent with the notion of change blindness (Levin & Simons, 1997; Levin & Varakin, 2004; Simons & Levin, 1997), a psychological phenomenon in which individuals fail to notice alterations in a scene or mislocations of objects while viewing edited scenes. By playing on the viewer's attentional focus, filmmakers impart a sort of magician's sleight of hand, drawing on moments when viewers are fixated on movement as a way to conceal edits. Thus, filmmakers have acquired knowledge about the cognitive demands of viewing movies and know when to insert an edit just as a magician knows when to conceal a coin or reveal a playing card. It is now up to psychocinematics to identify more explicitly the cognitive processes related to such “illusions.”

In evolutionary terms, our sensory apparatus is geared primarily toward helping us move around in space. From sensations we construct a spatial environment that places us within a three-dimensional setting. As mentioned earlier, within the cerebral cortex, the ventral path, which is involved in object recognition, and the dorsal path, which is involved in spatial processing, help to construct this spatial environment. Filmmakers have developed techniques that engage these spatial construction processes, as if we are enveloped within the 3-D world portrayed on the screen. Again, it is not as if we actually believe we are in the world projected, but we co-opt these basic cognitive processes while watching movies, and these processes drive our experience. Psychocinematics can help link basic spatial processes to our movie experience. In a match-action edit that occurred in The Unbearable Lightness of Being (1988, Orion Pictures), the noted film editor, Walter Murch, inserted a 10-frame overlap of the action (Murch, personal communication). In this scene, a camera shot of the character, Sabina (Lena Olin), bending down, cuts to a shot of her reflection in a mirror, which, of course, reverses the spatial orientation and causes the same confusion as violating the 180-degree rule. It may be that a cognitive reconstruction of the spatial scene was needed to interpret the shot transition, which took time, and thus required significant overlap in action to be perceived as a natural movement.

Sounds, both diegetic and nondiegetic effects, play an important role in our movie experience (see Boltz, 2001; Cohen, 2005). They can direct attention to people or objects, foreshadow events, and amplify emotions. In even a simple display, a sound can alter visual perception. In one study, individuals watched two disks move toward each other, overlap, and then continue on past. Yet when a click was presented at the moment of overlap, the two disks appeared to bounce and ricochet back in the opposite direction (Sekuler, Sekuler, & Lau, 1997). With respect to nondiegetic sounds, memory can be enhanced when mood-congruent music is played with an emotional scene. For example, a happy scene is remembered better when it is accompanied by upbeat music (Boltz, Schulkind, & Kantra, 1991).
Knowledge, Narratives, and Events

Considering the beholder’s share of our movie experience, we must acknowledge the role of knowledge in driving our movie experience. As mentioned earlier, we are always applying top-down processing, using our knowledge to develop expectations and guide sensory processing. Even before we sit down to watch a movie, top-down processing is working by way of knowledge we may have about the filmmaker, movie title, and other prior knowledge (e.g., having seen previews or hearing about the movie’s plot). From this knowledge, we develop a schema in the form of expectations of what’s to come. Moreover, from the thousands of hours of watching movies, television, and YouTube videos, we are very familiar with the ways movies are constructed.

To what extent does our movie experience depend on such familiarity? Schwan and Ildirar (2010) showed movie clips to individuals living in a remote mountain village in Turkey who did not have electricity and had never seen moving pictures. They showed various clips that included filmic techniques such as pans, cross-cuts, shot/reverse shots, and establishing shots. These individuals were very poor at interpreting story transitions when presented as shot/reverse shots, pans, and establishing shots, though they could comprehend cross-cut edits. These findings demonstrated that our understanding of the “syntax” of movies is to some extent a learned phenomenon acquired from the countless movies and television programs viewed during our lifetime.

Through storytelling, we have developed a schema for fictional narratives (see Brewer & Lichenstein, 1981; Currie, 2012). This schema generally conforms to Aristotle’s notion of a defined beginning, middle, and end, with various events (e.g., reversal of fortune, climax) presented along the way. Scriptwriters often use rigorously defined plot structures such that certain events are placed at specific moments in a movie. In Save the Cat!, a book on screenwriting, Blake Snyder (2005) suggests that scripts should always introduce the hero with an action that draws us to him or her, such as rescuing a cat. The second act, which is the longest, builds tension as the protagonist confronts a series of challenges. Of course, we are led to a climax, with the final act serving as a way of reducing tension and resolving conflicts. This narrative structure makes a story an emotional roller coaster ride, which begins with anticipation, creates tension, and when we reach the top we hang on for dear life. The parallels between movies and roller coasters are rather fitting as we actually pay for both experiences, expect an emotional thrill, and do so with the knowledge that we will survive at the end (usually seated in both cases).

An important aspect of psychocinematics is how we represent events, which can be described as actions encapsulated within a time and place setting. Fictional narratives can be construed as the sequence of events that make up a story (see Chapter 12). Individual events can be segmented further, such as a murder being segmented into finding a gun, loading bullets, and confronting the victim (Carroll & Bever, 1976; Newton, 1973; Zacks Speer, Swallow, Braver, & Reynolds, 2007). The pacing of events adds to the interest and enjoyment of a movie. Rhythmic pacing is exemplified by patterns of long and short shot durations throughout a movie (Cutting, DeLong, & Nothelfer, 2010; Salt, 2006). These waves of shot lengths heighten and ultimately break at the final climax.

A good movie creates a series of tensions and releases, suspensions and resolutions, or cues and responses (see Chapters 7, 10, and 12). In this way, the filmmaker flirts with the viewer by concealing and revealing knowledge as the movie proceeds. As described by
Berliner (Chapter 10), fictional narratives in movies can be described as the interplay between unity and disunity. In describing the visual aesthetics associated with paintings, Kreitler and Kreitler (1972) described art as creating a visual interplay of tension and release. Carroll (1985) described a movie's pacing as a series of questions and answers or what he termed the erotetic model of narrative. As events are segmented, there may be a hierarchy of unity–disunity, tension–release, or questions–answers, with the movie's climax providing the final resolution. With respect to psychocinematics, one could manipulate the degree to which a narrative follows such a scheme and determine if violations of pacing create confusion or a lowered aesthetic experience.

ENGAGING EMOTIONS AND EMPATHY

We laugh, cry, and become frightfully scared while watching movies. These feelings are driven largely by emotional engagement with the characters portrayed. Such empathetic responses first involve imaging oneself as someone else and, as a result, experiencing another's feelings (Shamay-Tsoory, 2010). The ability to take on the perspective of another requires a cognitive restructuring or what psychologists call a theory of mind (see Chapters 13 and 17). As mentioned earlier, the posterior parietal cortex is particularly active when we imagine the action of others (Saxe & Wexler, 2005). Such processes have been linked to the phenomenon of mirror neurons (Buccino et al., 2001; Rizzolatti & Fabbri-Destro, 2010). In neuroimaging studies, this region is involved whenever we must reorient ourselves in time and place, such as with theory of mind, remembering the past, or imagining what we will be doing in the future (see Buckner & Carroll, 2007; Shimamura, 2011). This cognitive engagement helps us imagine being someone else.

In addition to the cognitive restructuring of taking on another’s perspective, empathy involves feeling another’s emotion. Neuroimaging studies have shown that other regions, including the amygdala, insula, orbitofrontal cortex, and anterior cingulate cortex, are active during such emotional responses (Singer et al., 2004). In one study, emotion-related brain regions were active when individuals experienced an arousing event (an electric shock to the hand) and when they watched a loved one experiencing the same event (Singer et al., 2004). Filmmakers have developed creative use of camera movement and editing to enhance our empathetic response, and of course, good actors know how to express emotions in such a way as to encourage empathy (see Goldstein & Bloom, 2011). Quite frequently, it is our empathetic engagement that drives our emotional experience during movies (for details, see Chapters 5, 14, and 17).

Movie sounds, both diegetic and nondiegetic, significantly impact on our emotions. Abrupt sounds, such as a scream or explosion, induce a powerful startle response. Background music can amplify a variety of emotions, including sadness, fear, and joy. Simply hearing someone laugh can induce more positive emotions, as indicated by the inclusion of “laugh” tracks in TV comedies or hearing others laugh in a movie theater. Thayer and Levenson (1983) recorded heart rate and skin conductance (akin to measuring sweaty palms) while subjects viewed a safety film depicting industrial accidents. The clip was played with either calming music, horror music, or no music. Skin conductance (but not heart rate) was increased with horror music and decreased with calming music. Filmmakers sometimes include incongruent music as a way to create an eerie or ironic mood. In Alfred Hitchcock's The Birds, the
sense of eerie terror is created by the playing of foreboding music as viewers watch an otherwise innocuous shot of birds flying.

As with music, the visual scene itself can set up our emotional response. Suspense is driven by a sense of calm with the anticipation of impending terror. Indeed, anticipation or expectations play a key role in driving our emotions. The Russian silent filmmaker Lev Kuleshov considered such contextual influences. He interspersed shots of an actor exhibiting a neutral expression with shots of a child’s coffin, a woman, or a plate of soup (Levaco, 1974). This same “neutral” expression was interpreted differently depending on what image preceded it. Thus, the same expression appeared to show sorrow, lust, or hunger, depending on the context. Psychological studies of the Kuleshov effect have confirmed the impact of the social context on emotion (Marian & Shimamura, in press; Mobbs et al., 2006). For example, if a person smiles at you and then the smile turns into a neural expression, that person will appear somewhat grumpy or disappointed. Conversely, if a person first looks angry and then the expression turns into a neural expression, the person looks somewhat pleasant or positive (Marian & Shimamura, in press).

### Coming Attractions

The chapters to follow will elaborate and extend upon the issues introduced here. The next four chapters lay down the philosophical foundation of psychocinematics. Thereafter, sections are divided into the three psychological components of the I-SKE model—sensations, knowledge, and emotion—and how they drive our movie experience. The contributors focus primarily on the ways movies present and represent fictional narratives. It is noteworthy to point out that nonfiction films (i.e., documentaries) generally adhere to the same cognitive and aesthetic features as will be described for fictional narratives. That is, continuity editing, event sequencing, and empathetic engagement are hallmark features of good documentaries. An interesting goal for psychocinematics will be to consider how such features when applied to documentaries help disseminate knowledge in truthful (or less truthful) ways (see Chapter 8). Many students learn from movies, such as from NOVA programs, history/documentary channels, and YouTube videos, and it is important to consider the psychological processes that drive this potentially powerful form of learning.

Another consideration is the genre of avant-garde or experimental film. Although such films often use the kind of filmic techniques mentioned earlier to drive psychological processes, experimental films, almost by definition, attempt to extend the boundaries of what we think a movie should be. Such films often act as commentaries on the film process itself by breaking away from our movie schema (for further analysis along these lines, see Carroll, 2008). Some avant-garde films, such as Alain Resnais’s *L’Année dernière à Marienbad* (Last Year at Marienbad), offer interpretations of mental processes, such as the vagaries of reminiscence, through unorthodox narrative techniques. These movies define and describe the movie process through the process itself. In order to appreciate and enjoy such *meta-art* commentaries, it is necessary to have knowledge of the art of movies, its techniques, and its history.

Digital movies have special properties (see Chapter 6) and offer interesting possibilities for psychocinematics. One aspect is the way we experience digitally created movies that appear realistic though we know that the entire *mise-en-scène* was artificially contrived. For example,
these days animations through motion capture offer exquisite rendering of perspective and shading, yet we are aware that they are still animations. Computer scientists have a term, the “uncanny valley,” which refers to a drop in familiarity (i.e., a strangeness) when a robot becomes very close to human likeness. For example, a prosthetic hand looks eerily strange as it becomes very close to mimicking a real hand. A recent fMRI study (Saygin, Chaminade, Ishiguro, Driver, & Frith, 2011) suggests that the brain responds differently to android-like actions that closely resemble human actions when compared to real human actions or actions from an obviously artificial-looking robot. When we know that what seems real is really artificial, as in digital motion capture, how does our movie experience change?

Finally, there are social factors of our movie experience that influence our interest and enjoyment. For example, how is our experience influenced by the environmental context in which we view movies, as when we watch a movie with strangers in a theater, with a friend in the living room, or alone on our laptop? What cultural knowledge is required when we experience movies? How much are we missing when we watch a foreign movie? From I-SKE issues concerning sensations, knowledge, and emotion to more complex social factors, psychocinematics has the potential to address many aspects of our movie experience and perhaps in so doing enhance our aesthetic appreciation.

Acknowledgement

I thank David Bordwell, Helen Ettlinger, Faerthen Felix, Walter Murch, Mike Roush, Gregory Shimamura, and Thomas Shimamura for helpful conversations concerning the issues presented in this chapter.

References


2.4 | Psychocinematics


26 | Psychocinematics


