

I'm Sorry Dave, I'm Afraid I Can't Do That: The Technology of Digital Visual Effects

One of the greatest misconceptions about modern movies is that visual effects are generated by computers. Nothing could be further from the truth. Human inventiveness is the most important ingredient and it always will be.

—PIERS BIZONY, *DIGITAL DOMAIN: THE LEADING EDGE OF VISUAL EFFECTS*¹

Establishing the common ground of the classical narrative is only a beginning point for examining the extent to which DVFX have affected storytelling in film. To address how they make a difference to either the structure or the quality of storycraft, it is important to take into account the history of computer graphics and how they came to be such a significant part of film production.²

Computer graphics emerged from scientific studies in the 1940s and 1950s, when computers were used to drive mechanical means of producing graphic images. In the early 1960s, Ivan Sutherland's Sketchpad graphic interface would lead to the CAD (computer assisted design) and CAM (computer assisted manufacture) applications of the automotive, naval, and aeronautics industries. Sutherland is a pivotal figure in the development of computer graphics, and his graduate students from the University of Utah include the leading developers of the major computer-graphics advances that have changed the world.

Before long, architects and artists adopted new CAD and CAM techniques for their own uses. The brothers James and John Whitney Sr. are recognized as being among the first to create computer assisted art. Interested in the relationship between music and abstract imagery, they built their own equipment from repurposed computers and optical printers to create short films combining

music and images, developing techniques copied by those who followed in their footsteps.³ Most famously, the star-gate sequence of *2001: A Space Odyssey* used the Whitneys' slit-scan system—holding open the shutter while moving artwork held behind a slit in a screen to create the flowing images of light.

Corporate, military, scientific, and academic research all contributed to the establishment of the computer science discipline and the breakthroughs needed to make it one of the most powerful influences in the latter half of the twentieth century. For example, Bell Telephone Laboratories funded an extensive research-and-development program in communications technology. The brief to researchers was broad, including everything from visualization of satellite technologies to collaborations between artists and researchers to create new uses for the technology.⁴ In the late 1960s and early 1970s, several short films using computer-assisted-art techniques gained recognition. Peter Foldes's *Hunger* was even nominated for an Academy Award in 1974 and won a jury prize at Cannes.⁵

At the same time, key figures such as Ed Catmull, Alvy Ray Smith, and Jim Blinn were developing the programs and graphic-imaging techniques that would lead to fine-art and feature films created with computers. Another key figure to shape this developing use of computer graphics was Robert Abel, who was an early adopter and pioneer using computer generated images at video resolution for use in advertising. In 1983, Abel's company created the "Sexy Robot" ad that used live-action footage with markers that the computer artists used as a reference in creating an animated robot, and the ad was something of a *Metropolis* (1927, Lang) homage. Thanks to early hierarchical programming techniques, the robot's performance was convincingly human.⁶

Feature films also were making tentative use of computer graphics, but it was not until *Tron* (1982, Lisberger) that computer graphics were a main component of a movie. While the "first all-digital computer-generated image sequence"⁷ was created by George Lucas's Industrial Light & Magic (ILM) for *Star Trek II: the Wrath of Khan* (1982, Meyer), the shot itself was embedded within a movie franchise that was characterized by special-effects usage. Thus, the Genesis Effect—as the sequence was called—fit neatly into the film's narrative, whereas the computer images in *Tron*, while essential for the film's premise, were not supported by the strong narrative needed to engage audiences. In Frank Foster's documentary *The Story of Computer Graphics* (1999), Richard Taylor, one of the CG team members involved with *Tron*, observes that "if (a film) doesn't grab you by the heart, it doesn't matter technically how it looks. In the end, a film is a story and . . . the density of visuals in films or the look of the film

doesn't guarantee success at all."⁸ Abel, who also contributed to the film says, "the bottom line of *Tron*. I think that we all learned . . . it's the story and the involvement with the characters that really makes or breaks a film."⁹

Many blamed computer graphics for the failure of *Tron* at the box office, and it would take films like *Willow* (1988, Howard) and *The Abyss* (1989, Cameron) to persuade filmmakers to risk using computer generated images in other projects. Thereafter, the firsts and the greats followed in rapid succession. *Terminator 2*, *Jurassic Park* (1993, Spielberg), and *Toy Story* (1995, Lasseter) all established that computer generated images could do better at the box office than films made exclusively with human stars. Indeed, by the mid-1990s, films vied to achieve greater and greater breakthroughs in digital computer imagery—both in terms of technological significance and of spectacle.

As computer capacities grew to meet the data load for film-resolution images, and as effective ways of getting film in and out of the digital medium became readily available, the cost efficiencies of doing digital optical work came within reach. With the volume of work growing and as training programs providing a base-level skilled workforce proliferated the resulting drop in production costs made digital solutions attractive to many more filmmakers. Dust-busting (removal of dust and specks from film negatives), wire removals, simple composites, and very basic CG enhancements of live-action footage became commonplace.

Errors such as booms in shot, crew reflections in windows, inappropriate signage, and continuity problems from changed weather conditions all could be addressed with a quick, and relatively easy, digital fix. As these kinds of practices infiltrated the production process, more imaginative and creative approaches also became common. For example, making cost comparisons of digital set extensions and composites of second-unit live-action plates with bluescreen studio performances versus location shooting became a reasonable way to find budget savings.

For lower- and midrange-budget productions, script elements that might once have been discarded because they would be beyond production funding—such as snow scenes, boating scenes, or wilderness shots—could be weighed in terms of story value because digital visual effects might make it possible for such images to be attained at a reasonable expense. The growing expertise and numbers of effects houses also made it possible for productions to shop around and find experienced effects artists who were prepared to take on projects below cost for the value of a feature-film credit on their showreels.

Summarizing the impact of this period, Carl Rosendahl of Pacific Data Images says, “. . . what we’ve seen happen is special effects films have gone from films that have ten, twenty, thirty special effects shots to films that have 800 special effects shots in them and more and more you know you’re seeing not just that the films are using the technology but they’re using them in huge ways. So live action films are becoming more and more computer generated.”¹⁰

To what extent this is apparent is another matter altogether. A list of special-effects films would, of course, include titles such as *Star Wars* (1977, Lucas), *Jaws* (1975, Spielberg), *Jurassic Park*, and the *Terminator* films (1984, 1991 Cameron; 2003, Mostow). Films such as *Citizen Kane* (1941, Welles), *Gone with the Wind* (1939, Fleming), and *The African Queen* (1951, Huston), though all used optical effects. Herein lies an important point. What is identifiably “spectacular” is not the full measure of special-effects usage, let alone digital-visual-effects practice.

In keeping with the long tradition established by the use of optical and other special effects throughout the history of film, DVFX are not the exclusive domain of certain genres or styles of films, even though they may feature more heavily in some. The addition of DVFX expands the repertoire of special effects techniques in traditional filmmaking broadening the representational tools of filmmaking as a whole.

Although many in-camera techniques are still preferred, DVFX have quickly replaced the majority of traditional optical and photographic techniques. Digital visual effects both extend traditional techniques and allow them to be used with greater complexity, flexibility, and precision. Similarly, 3-D modeling has built upon a tradition of animation, claymation, and puppetry to create new kinds of images. Now filmmakers can manipulate images by removing from, adding to, scaling, warping, and grading images obtained photographically. They also allow the creation of entirely digital images that are practically indistinguishable from traditional photographic images. Further, computer graphics allow the addition of simulated camera moves, lens effects, color manipulations, digital lighting, and other details such as grain to emulate photographed imagery.

In applied terms, DVFX can be used to achieve a range of narrative purposes, some of which are self-effacing, others of which are deliberately spectacular, as chapter 4 details. Traditional special effects served narrative purposes in these same ways, however the control and invisibility of many digital-visual-effects techniques has extended the self-effacing qualities of effects work in the same way it has extended its spectacularity.

At the most basic level, simple image corrections such as removing dust specks or repairing scratches on the negatives of otherwise standard photographic images are among the most common of invisible practices. Generally, these techniques restore a damaged image and make it useable, and their application is virtually undetectable.

Effects also can remove unwanted portions of images, such as wires used in stunt work or inauthentic elements for period detail in films (for example, TV antennas, power cables, etc.). Removing of advertising information for which clearances cannot be obtained or other brand names and public signage from images is common also (as is the opposite, the insertion of product placements). These kinds of treatments preserve the diegetic world and amend images for commercial and legal purposes.

This first usage shows the narrative uses of DVFX, the latter example highlights issues that arise in filmmaking that might require pragmatic digital image manipulation. Generally, removing signage or similar image alterations to protect privacy, prevent legal disputation, or achieve other, similarly benign, intentions is accepted as a matter of course. However, digital product placement is a matter of some controversy.

The introduction of product placement has always raised ideological issues, and now DVFX offer an unlimited capacity to manipulate the contents of the frame. However, the use of DVFX to support the practice of product placement is not demonstrably different from any of the other means of introducing commercial interests into movies, such as the inclusion of a particular brand of sneakers as part of a lead actor’s costume and the addition of commentary on them within the dialogue. This application of DVFX is simply an extension of the larger practice of product placement and is not specifically characteristic of DVFX per se, although it is indicative of yet another means by which commercial and marketing influences can be advanced. The use of DVFX for product placement is not a specific narrative issue in the context under discussion in this book. The practice of product placement overall has narrative implications—ones that are worthy of examination—but it is outside the parameters of this topic, even if DVFX are used to extend the practice.

Returning to the range of digital touch-up techniques and some of the reasons why they are used, it should be noted that when removing elements from an image, it becomes necessary to add back to the image—either by painting over the unwanted element or by compositing another image in its place. Composites are one of the most extensively used DVFX. A composite takes multiple

images to create a new, unified image from the separate elements. This technique can be used to insert sky replacements (substituting night skies, sunsets, weather changes, etc.), or to add synthetic realities (such as computer-generated sets or landscapes), or performers (for example, merging scenery with blue-screen footage of actors or CG performances and characters).

Increasingly films contain composites with hundreds of separate images and layers of effects, a level of complexity that would have been impossible for even the greatest optical technicians.¹¹ Assessing the use of composites requires contextual analysis to determine their role across genres and kinds of narrative. A framework for such an assessment is the focus of chapter 4, but the important point for the current discussion is that composites are as capable of being self-effacing as they are of being spectacular.

Digital visual effects can also entail the use of CG elements that range from minor enhancements and manipulations of photographically obtained materials to fully CG environments, objects, and performers. The narrative usage of these elements must be assessed contextually because even fully CG characters can appear in films without their synthetic qualities being readily apparent. While characters such as Gollum in the *Lord of the Rings* trilogy (2001, 2002, 2003, Jackson) celebrate the animators' achievements and the motion-capture performance of a human actor, many films have fully synthetic performers interpolated between stunt-performer and actor footage with such success that the digital effects house's element tapes (tapes that show each of the separate elements used in the composite and the different stages of image construction) must be slowed down for the subtle blending of images to become detectable by the human eye.

Unique Techniques

The range of digital effects practices and the instances of them are vast. As Rosendahl has indicated, the prevalence has grown not only in numbers of shots but also in numbers and kinds of films. A contributing factor to this is the unique techniques that digital effects offer to filmmakers, which include: virtual camera moves and digital lighting, synthetic realities, full CG imagery of photoreal standard, motion capture of performances, and CG characters.

For film theorists and filmmakers, the virtual camera is one of the most significant features of digital visual effects. The virtual camera is a computer-generated camera effect that can range from simulated camera moves, focus-

pulls, and lens effects such as halation. It also refers to the fact that the length of shots generated or enhanced by the computer are not constrained by the amount of film a camera magazine can hold. According to Alvy Ray Smith, the aforementioned Genesis Effect for *Star Trek II* won approval from George Lucas because it comprised sixty-second virtual camera move that simply could not be achieved with a real camera.¹² The ability to zoom out from the subatomic level to outer space, and to do so in a single shot without any traditional editing and constrictions on shot duration because of physical limitations, transcends standard cinematography and offers an array of storytelling benefits.

For example, the film *Fight Club* (1999, David Fincher) opens with a shot that commences deep inside the main character's brain and ends at the barrel of the gun jammed in his mouth. This shot provides an early clue that much of what will be seen in the film is happening inside the character's head but, as such images were so uncommon at the time, the audience was unlikely to understand the sequence until the shot ended. The significance of the shot in terms of what it reveals about the story is not clear until the last act of the film, where the revelation has the most dramatic power and the first shot delivers its payoff. Interestingly, this once-innovative technique is used now commonly in standard television dramas.

Another example of a story-driven virtual camera shot and the seamless use of CG images can be found in *Panic Room* (2002, Fincher). As the mother and daughter settle in to sleep in their new house for the first time, the camera flows from one storey to another, ranging through the house to show the intruders and their attempts to break in. The camera tracks smoothly through walls and floors, into keyholes, and back up to the roof, unrestrained by the physical world. This omnipotent point of view, this transubstantiation, frees the storyteller, allowing images to flow smoothly and seamlessly, drawing the narrative point of view where it needs to go without limitations from the amount of film in the can, scope of a physical set, or location. The tension that this shot creates for the audience is quite powerful and engaging. The ability of the camera to intrude, impervious to physical barriers, signals that the woman and child are vulnerable, that the locks and bars will not keep the men from getting inside the house.

The acceptance of these kinds of virtual camera moves has been conditioned by their similarity to familiar physical cinematography using aerial, steadicam, tracking, and crane shots. These techniques have explored many ways of creatively moving the camera and established cues for audiences over a number of

decades. For example, using a crane shot to push in through a window to enter a scene sets up the now-familiar stylistic convention that makes the digital shot in *Panic Room* a reasonable point-of-view (POV) for a spectator.

However, physical limitations are exactly that—they are limitations. Leo Braudy and Marshall Cohen quote René Clair, who observed, “If there is an aesthetics of the cinema . . . it can be summarized in one word: ‘movement.’”¹³ Up until the advent of DVFX, the movement of the camera was realistic at least in the sense that there had been a camera in relationship to the material being filmed, but it was limited by the physical reality that it had to be placed somewhere. With the advent of virtual camera moves, microscopic and telescopic views, X-ray, and God’s-eye POV shots are now integral to the canon and thus, in keeping with Clair’s observation, the aesthetics of the cinema have been enhanced dramatically.

This is not to say that physical camera moves failed to take up these points of view. Edward Branigan’s book *Point of View in the Cinema* examines camera movement in great detail, and he notes that a point-of-view shot is not limited to humans or even to living things.¹⁴ However, the virtual camera opens up the moves and POVs that are attainable with its ability to move between well-established camera positions and more imaginative framings (ones that can be imagined rather than creative exploitation of those that are actually physically accessible). These expanded possibilities have made the virtual camera considerably more commonplace.

The Virtual Camera and CG Performances

In discussing the CG camera positioning in *Trom*, Scott Bukatman comments that “the camera finally serves to give the viewer a place in this computerized world, a place defined almost solely in terms of spatial penetration and kinetic achievement.”¹⁵ He argues that this kinesis is “fundamentally bound to narrative”¹⁶ and is also a factor that some critics say contributes to spectacularity and “excess.”

An example of how the virtual camera has changed cinematographic storytelling conventions is the fairly standard shot of tracing a telephone call. Shots often have tracked down from the telephone receiver, along the cords, up against a wall, and then along more wires, moving next from an outlet in a wall, back along another telephone cord, to the receiver in another character’s hand. The digital version—perhaps like the digital transmission of calls themselves—has changed. Now the POV is capable of entering into the mouthpiece, traveling

through the wire, and through a visualization of the computer chip’s interior and transmission of data, back out from the phone, perhaps into the ear and brain of the other character, and finally taking the POV of the character looking out at his image in a mirror as he holds the phone, giving the perspective as though the camera were placed inside the character’s head.

Consider then the different kinds of story information that these two shots can convey. In a story that calls for the voice on the phone to have great significance for the receiver of the call, the traditional method of shooting would require some other means, perhaps as part of the dialogue, to indicate that the caller’s words had the power to affect the receiver in such a way that he looked at himself differently. In the digital shot, however, it would be possible to show this—to provide a representation of this idea—through visuals alone.

This concept is at the heart of the film *Being John Malkovich* (1999, Jonze), where effects sequences depict travel through a portal to the masked camera view from within the consciousness of John Malkovich. The combination of effects and camera POV readily communicates the concept of the “journey” from the physical world to the physical perception from within the consciousness of another. The narrative makes a parody of the spectacularity by openly commenting on the voyeurism as the characters go into business and sell the opportunity to “be” John Malkovich.

Thus, on a practical level, almost every kind of imaginative and difficult shot now can be accomplished by using a digital suture to blend live action with CG enhancements, creating convincingly photoreal environments and mise-en-scene. Underwater shots, subterranean shots, extraordinary angles, transitions to and from different points of view, and visual links between settings in a form of montage can be made without any restrictions except the imaginations of the director and the director of photography (DP). The value that this freedom has for filmmakers is difficult to overstate. James Monaco has noted that camera “movements and their various combinations have . . . an important effect on the relationship between the subject and the camera [and therefore the viewer], . . . [and so] camera movement has great significance as a determinant of the meaning of film.”¹⁷

Monaco’s discussion of meaning draws upon semiotics, and he states that the paradigmatic and the syntagmatic, represented by the directorial decisions how to shoot (paradigmatic) and how to present what has been shot (syntagmatic), are the key elements in determining what a film means.¹⁸ In addressing the matter of framing, he refers to Rudolf Arnheim’s work citing balance, shape, form, growth, space, light, color, movement, tension, and expression as key

qualities for analysis of film images.¹⁹ Monaco holds that “two aspects of the framed image are most important: the limitations that the frame imposes, and the composition of the image within the frame.”²⁰

He also identifies three sets of compositional codes: plane of the image, geography of the space photographed, and plane of depth perception, stating that “the closer the subject, the more important it seems.”²¹ He goes on to discuss the various camera moves and lens techniques, maintaining that their uses indicate relationships and cues needed for the viewer to read the images presented.

David Bordwell also has documented camera movement and shot composition. In *Film Art*, he and Kristin Thompson have defined film form as “the total system that the viewer perceives in the film,” drawing particular attention to narrative and stylistic elements.²² Further, they suggest the following criteria in order to “assess films as artistic wholes: complexity, originality, coherence, and intensity of effect (for example, vividness, strikingness, and emotional engagement).”²³

In terms of cinematographic qualities, they define this as “control over three features: (1) the photographic qualities of the shot; (2) the framing of the shot; and (3) the duration of the shot.”²⁴ In respect of these qualities they make the following observations pertinent to the argument at hand. They note “that framings have no absolute or general meanings . . . [that] meaning and effect always stem from the total film, from its operation as a system. The context of the film will determine the function of the framings, just as it determines the function of mise-en-scene, photographic qualities, and other techniques.”²⁵ They also observe that “camera movement illustrates very well how the image frame defines our view of the scene.”²⁶

Branigan also has identified many conventions of camera use and includes optical-effects techniques alongside of “the dolly, track, crane, pan, tilt, and lateral tilt.”²⁷ He has addressed the “impossible” placement of the camera, stating, “To the extent that the camera is located in an ‘impossible’ place [he gives the example of a shot from within a fridge], the narration questions its own origin, that is, suggests a change in narration.”²⁸ He goes on to say, “In evaluating a text, one must consider the interrelations of all the levels of narration.”²⁹

As these film theorists show, the way cameras are used, how images are created, and the qualities that these images possess have been the subject’s of extensive analysis. Nonetheless, as with the discussions of writers on film storycraft and narrative theorists, the interests of cinematographers and film theorists are related but are not the same. Cinematographers and filmmakers, like script

writers, are concerned with the creation of the shot and how to tell the story. Film theorists seek to analyze the how and why of the filmmakers’ achievement.

Much of the documentation and analysis of physical camera techniques and their effects pertains to computer-generated camera practice, if for no other reason than that these techniques and the artifacts of the physical technology have set the standard for how the virtual camera is used. Indeed, as Lev Manovich has noted, “we are witnessing . . . the translation of a cinematic grammar of points of view into software and hardware. As Hollywood cinematography is translated into algorithms and computer chips, its conventions become the default method of interacting with any data subjected to spatialization.”³⁰ Yet the scope of the camera in the digital environment is considerably greater than that permitted by the physical world, even if the conventions established there are becoming determinants of the virtual camera’s abilities. In spite of the incorporation of these conventions, the virtual camera opens up whole new vistas of creative opportunity and room for theoretical analysis.

This raises a number of interesting questions. Do CG artists and directors with a good understanding of DVFX define their shots with a freer sense of camera movement? In the broader debate about norms of classical narrative, should classical cinema moves be preserved or should we allow the extra-natural abilities of the CG camera to add to our perspective/film language?

Branigan’s exploration of the relationship between narration and point of view addresses these questions almost exhaustively. He identifies “six elements of classical representation in the arts,”³¹ which he describes as “origin, vision, time, frame, object, and mind.”³²

Bordwell argues that classical narrative is essentially omniscient: “The most evident trace of the narration’s omniscience is its *omnipresence*. The narration is unwilling to tell all, but it is willing to go anywhere. This is surely the basis of the tendency to collapse narration into camerawork.”³³ And while he has noted that night shoots once were an expensive novelty³⁴ and that camera movement was once a form of spectacle,³⁵ the capacity for classical narration to appropriate the unusual to serve narrative purposes can be seen to apply to virtual camera moves also.

In *Making Meaning: Inference and Rhetoric in the Interpretation of Cinema*, Bordwell notes some of the major critical stances regarding camera use. In particular he argues that the “camera construct allows the critic to posit the image as a perceptual activity . . . as a trace of mental or emotional processes . . . [and that] the critic personifies the camera in order to link it to the narrator.”³⁶ He also

summarizes Laura Mulvey's critical work on visual pleasure and quotes "there are three different looks associated with the cinema: that of the camera as it records the profilmic event, that of the audience as it watches the final product, and that of the characters at each other within the screen illusion."⁵⁷

For Mulvey, the significance of the looks she defined offer a means to examine feminist issues, just as other theorists have used her framework to identify racial issues. Applied to the consideration of digital-effects usage, where digitally created images apply the same methodologies and techniques of physical camera practice, the same analytical approaches hold. Where the camera is used in new ways, new questions arise. For example, in a shot where the camera looks out through the eyes of a character at his own reflection in a mirror, there is more than one "look" in operation. This is especially the case given that such a shot can have many computer-generated cues tied to it, enhancing the verisimilitude of the idea of looking through the character's eyes. Thus there is the look of the camera and the look of the character, but in this example the images preceding the final shot make it clear that the camera (we) are looking out from within another—at least, we are to assume that this has happened.

Traditional filmmaking also has undertaken shots of this kind, using framing to suggest that the camera is a character looking into a mirror, and camera movements such as pans and tilts can be associated with these mirror-image shots to enhance the impression that the camera represents the character's POV. Branigan explores this issue of point of view and cites the experiment of *Lady in the Lake* (1947, Montgomery), which attempted to tell the story entirely in the POV of the lead character.

But the limitations of the physical camera mean that these images usually are not accurate in the way that a CG camera image from within a character's POV can be. Where traditional shots can suggest such a look, a digitally enhanced shot preceded by images that set up the concept of entering the brain can more accurately portray this point of view.

How such camera usage could be interpreted in light of the kinds of issues Branigan and Bordwell note regarding states of mind and narrator view is one of the matters that needs to be addressed by theorists who are prepared to look beyond the spectacle of camera movement freed from physical constraints. The Genesis Effect, with its impossible camera move, was made twenty years ago and many, many more films since then have used DVFX to extend camera movement; such moves are now an integral part of the classical narrative's storytelling technique.

The virtual camera's freedom and omnipotence are but two of the new qualities DVFX bring to filmmaking. Shots can be relit digitally to change the direction and source of the lighting in a scene, either to change the mise-en-scène or to make separate shots match up better. It is possible to regrade the image and create day-for-night footage and thereby substantially alter the time frame or mood of a scene. Filmmakers also can manipulate the color of the image and can do this selectively within the frame, a practice that has been used for narrative and thematic goals such as the addition of color in the black and white world of *Pleasantville* and in *Schindler's List*, as the case study in chapter 9 shows.

It also is possible to manipulate qualities of the photographic image and add camera moves to manipulate time, extending the traditions of slow-motion and fast-motion images, including time-lapse photography. The Bullet Time images in the first film of *The Matrix* (Andy Wachowski/Larry Wachowski 1999, 2003, 2003) trilogy are possibly the most readily recognized instances of this kind of time manipulation, but slow-motion shootouts have featured in films that predate digital technologies.

As Monaco summarizes:

Film . . . is a tool that can be applied to time in the same ways that the telescope and the microscope are applied to space, revealing natural phenomena that are invisible to the human eye. Slow motion, fast motion, and time-lapse photography make comprehensible events that happen either too quickly or too slowly for us to perceive them, just as the microscope and the telescope reveal phenomena that are either too small or too far away for us to perceive them.⁵⁸

In her paper "Cinematography: The Creative Use of Reality," Maya Deren examined slow-motion imagery and, paralleling Monaco's view, describes it as "a time microscope."⁵⁹ She also describes the use of reversal of motion photography as "an undoing of time."⁶⁰ Deren discusses the optical processes that can be used to extend time by adding additional frames and using editing techniques such as those that use different takes from different angles to extend scenes to give the sensation of an act or a moment being prolonged. These techniques and her observations of them remain relevant to digitally created images, but the ability of DVFX to go beyond the techniques she has noted offers additional scope for examination.

Digitally created images permit the revelation of subatomic or extraterrestrial images, the ability to stop an image in time and space and examine it from

any angle, of any level, and at any speed and degree of detail. These abilities and the capacity to transition between any of these states with fully visualized representations can confer extraordinary powers of observation. As Arnheim has said, “The motion picture has broadened not only our knowledge but also our experience of life, by enabling us to see motion that is otherwise too fast or too slow for our perception. . . . The acceleration of natural motion, in particular, has impressed our eyes with a unity of the organic world of which we had at best only theoretical knowledge.”¹¹

The ability of DVFX convincingly to portray theoretical and speculative imagery extends this power of observation. Such imagery is a time and space *hyperscope* that allows time and space to be tangible, elastic, and controlled. As the *Fight Club* and *Panic Room* examples given earlier in this chapter show, it is possible for the point of view to be taken from positions that are grounded in, or in some instances exist solely in, imagination.

One of the best demonstrations of this power is the interactivity that digital visual effects shots allow between levels of time and space. It is possible for an element to allow for interactivity between live-action footage and CG imagery composited into the frame to a degree that traditional methods did not allow, with elements frozen in time becoming accessible and manipulable by other portions of the image, portions allegedly in a different time/space.

By way of example, in the third series of the *Star Trek: Enterprise* television series, Captain Archer reenters his cabin where a cup of coffee is suspended in midair, with the coffee spilling into the air, frozen in time. This image is offered as visual proof of the time/space anomalies taking place on the ship, a narrative construct indicating danger to the crew. As Archer walks into the room, his image is visible through the liquid that is suspended in the air. He walks around the cup and the trail of coffee as if it were a physical object, then, to show his annoyance, he plucks the cup from midair and puts it back down on his desk. The spill of coffee remains suspended in time and space, its perspective changing as the camera moves.

This scene conveys important story information, visibly demonstrating the presence of a strange force on the ship. It plays with time, giving symbolic indication of the “out of the ordinary” environment of the *Enterprise* and its crew, pointing to the larger questions and theories about what is to be in space should we ever venture so far. It also reveals the character’s state of mind by giving him an action to demonstrate his frustration and his desire to be back in control of the events on his ship. In storycraft terms, the ability to show spatial distor-

tion—a fairly complex concept for a mainstream television series—and the state of a character’s emotions and thoughts would suggest that this digital-visual-effects shot provides a valuable storycraft tool. It is more than a simple composite of CG elements with a live action shot because in addition to being convincingly executed, it imparts crucial story information. As Branigan has noted, “Time . . . exists in a text only as constructed by the text itself, i.e., through narration. . . . Devices like slow motion, the freeze frame, or superimposition in film narration often function to break one temporal unity in order to introduce a different unity and often a different narrational level.”¹²

Another significant addition to storycraft that DVFX offer is the ability to generate images either totally digitally or by digital enhancement of live-action footage. The range of shots that this would encompass is extensive, including establishing shots; scene and set extensions; composites of generated images, such as screen graphics or models; and treatments of images such as the addition of smoke, particle effects, or weather elements. These examples are not exhaustive but indicate the broadness of the potential application of these kinds of DVFX.

One of the most common of these practices is the digitally enhanced or fully CG establishing shot. Computer-generated elements can blend into live action footage by playing upon the established technique of an aerial flyover but adding CG elements to create the diegetic world. For example, a scene can commence with a live-action aerial shot over a field and river, the camera movement flowing smoothly toward a town that nestles in the bend of the river. The shot can linger to reveal the town undergoing the changes of seasons, with the camera flying closer and closer to the buildings, revealing the narrow streets, establishing key buildings and exteriors and then, without any cuts, enter into a building where the first scene of live performance begins.

This shot might be composed of real aerial footage of a river and surrounding fields, motion-control images of miniatures of the town backed by a CG matte painting that draws upon some of the photographic elements of the aerial photography, CG shots of specific buildings created in 3-D, and CG treatments of the miniature shots to allow gradual revelation of the seasonal changes. This all can be composited, with CG camera moves masking the transitions between forms of image creation or image capture, ending with a transition to traditionally obtained on-set performances.

If the time and place of the story are fantastical, then it is likely that the viewer will assume that the techniques described above have been used, although

the expertise of the effects house may make it difficult to discern exactly which processes were employed. If the time and place of the story are contemporary, “real world” settings the entire sequence may pass undetected as a digital visual effects sequence.

These two examples highlight the difference between DVFX that either conform to spectacular usage or reflect the self-effacing devices of classical Hollywood narrative. The technology and the practices used to obtain, create, and combine images could be the same in either case. For the fantastical setting, the intention most likely would be to create a spectacular delight. For the contemporary setting, the intention might be to establish the diegetic world in a convincing manner with the use of DVFX being driven by the impossibility or impracticality of obtaining suitable location footage, the desire to create an opening sequence that cannot be obtained with traditional cinematographic methods, or the need to maximize production efficiencies.

Between these two story examples lies a host of narrative settings and requirements that can be achieved with the same range of digital techniques. It is in this way that the story determines the DVFX. Common to all stories would be the camera movement and the sensation that it provides in easing the story from the wider setting of the world that surrounds the specific circumstances and needs of the actors in the room, to the drama that unfolds between them.

These settings, these worlds surrounding the drama, might range from Middle Earth to modern middle class societies, but they are important to the storyteller and to the audience. Where is the story taking place? To whom is the story taking place? When is the story taking place? Why is it taking place? All of these questions address the story elements that need to be pulled together just as the physical elements of the image must also be created.

The ability of synthetic realities and full CG imagery to “pass for real” is not simply a conceit of DVFX artists. Referring to *Apollo 13* (1995, Howard), Piers Bizony quotes Digital Domain’s Scott Ross:

We went through a phase with *Apollo 13* and other projects where it wasn’t obvious to audiences that we’d done such marvelous work. Even some veteran lunar astronauts who maybe should have known better, congratulated us on having cleaned up NASA archive shots so beautifully, which, of course, is not at all how we did that movie.¹⁵

Rosendahl’s estimate of a film including up to 800 digital effects shots may include some obviously spectacular sequences that draw attention to them-

selves as digital magic, but most of the shots in such a film may be ones that do not betray their digital origins. This photoreal quality extends itself to performers as well as buildings, vehicles, and geographic vistas.

Digital performers, once the subject of extensive discussion and concern in the industry, are now so prevalent they no longer merit remark unless they hold a major character role. While the debate as to whether a digital performer will ever hold a starring role is moot, given the achievements of characters in the *Star Wars* and *Lord of the Rings* films, the question of whether such a character could “pass for real” remains.

In the devices of CG bit parts, stunt performance, digital crowd extras, and live-action manipulations—such as the performances by the animal characters in the *Babe* films (1995, Noonan; 1998, Miller), or the historical characters in *Forrest Gump* (1994, Zemeckis)—the achievements are many and readily accepted. Although resorting to rows of painted cotton buds or cardboard cut-outs to fill out crowd scenes is not entirely a thing of the past, digital CG crowd replication is now a standard production practice and is the kind of effect that can be used with seamless precision in virtually any film that has call for a great number of background extras. One of the more famous instances of digital extras is that of passengers on James Cameron’s *Titanic* (1997).

Although *Titanic* enjoyed a high level of interest because of its use of DVFX, in another filmmaker’s hands (and with a less spectacular budget), a period film that used the digital-visual-effects techniques that were in *Titanic* might have been able to enjoy less scrutiny for its technical standards, with many of the effects being accepted at image value. In other words, the same DVFX used in a movie-of-the-week shipboard romance would pass almost without notice, so closely do the effects fit with the classical narrative traditions.

For the most part, it was traditional special effects (including enormous feats of practical, mechanical, and modeling effects) and simple matters such as building an entire studio that took the budget and the spectacularity of *Titanic* into the history books and far beyond the scope of most productions. The DVFX however, although executed with superlative precision and experience, are not groundbreaking, nor are they now—less than a decade later—beyond the means of most period films.

As Cameron himself has noted, *Titanic* is not a blockbuster style film. It is a period romantic drama. In the *Cinefex* special edition on the film, he is quoted as saying, “. . . we do a movie that has no franchise potential whatsoever, no merchandising potential, that’s about people and emotions, and not one

mindless action sequence after another—and we get pilloried for being typical of what’s wrong with Hollywood.”⁴⁴

Primarily, it was viewed as an effects extravaganza. And while *Titanic* is a technical masterpiece—with such budgetary largesse, it should be spectacular!—the truly impressive use it makes of DVFX are the ones least likely for audiences to have noticed. The film had only one fully CG shot (an underwater view of the ship). The remainder of the work involved motion capture and character animation, the digital ocean, data integration, the digital ship (although a great proportion of the shots involved physical models and sets), and digital finishing—those elements needed to blend the variously created and obtained images and finesse them to an integrated photoreal standard.⁴⁵

While a number of these shots involved elements that have already been discussed, such as virtual camera moves and establishing shots or set extensions, one of the outstanding capacities provided by DVFX is that of motion capture and CG characters. Motion capture is a means by which the physical performance of an actor (or dancer, gymnast, martial arts expert, etc.) can be recorded as data and then plotted to a wireframe model to form the basis of a CG character’s performance. This data is amazingly accurate and convincing to viewers.

Whether using motion capture or traditional techniques, character animation is one of the most difficult of the visual representational arts because people can read and understand minute details of body language and physical communication. Of course, there are many factors that affect such awareness and communication, but from an animator’s point of view, the task of creating a believable, engaging character is an enormous challenge. Motion capture, however, offers a direct tap into that certain something that communicates a human essence that a viewer can read and believe.

Digital Domain used motion capture as the basis for extras in *Titanic* and André Bustanoby has commented on the subtlety the technology records:

When a real mother picked up her equally real young child, the mother’s body instinctively relaxed when the youngster was safe in her arms, and the performance-capture system picked up on a subtle nuance that even the most experienced traditional animator might have found hard to create from scratch.⁴⁶

He goes on to discuss the recording of friends and coworkers in extras roles and the experience of animating them and discovering that as the data is used, the individuality of the people shines through, revealing “the humanity that

you’ve captured.”⁴⁷ Remington Scott, responsible for the motion capture for both *Final Fantasy: The Spirits Within* (2001, Sakaguchi and Sakakibara codirector) and the *Lord of the Rings* trilogy, commented on the performance obtained and created for the *Lord of the Rings* CG character Gollum.

The power of motion capture, as demonstrated through Andy’s [Andrew Serkis] performance, is one in which an actor can expand beyond traditional typecasting and play a character that is completely different in physical appearance. This is pushing the boundaries of film technology and the relationship between the actor and the audience.⁴⁸

The blending of animation and motion capture often is used to persuade audiences that what they see is a human performance and not a computer-generated animation and, to some extent, it is true. There are implications for the use of interpolated CG images in stunt work that are addressed in chapter 5, but the key point here is that performance is no longer an image on screen that reflects solely the qualities of the recording arts. Increasingly, the representational arts are factored into what is seen and believed to be photography.

Although digital visual effects cannot lay first claim to having fooled an audience (indeed, Stanley Kubrick’s *2001: A Space Odyssey* failed to receive an Academy Award nomination for costuming, it is believed, because the Academy assumed that the film had used real apes),⁴⁹ it has introduced synthetic performances that are not recognizably digital. Even for performances that are fairly fantastical—such as the stunt work in a film like *Blade II* (2002, del Toro), it is likely that even an audience familiar with digital visual-effects techniques might assume the performance is primarily a composite of wire removal and frame-rate manipulation devices, when, in fact, digital performer interpolation is used.

The use of computer-generated performances brings into question assertions such as John Ellis’s that “what the film performance permits is moments of pure voyeurism for the spectator, the sense of overlooking something which is not designed for the onlooker but passively allows itself to be seen.”⁵⁰ In the case of digitally created performances, *everything* is designed for the onlooker, absolutely every nuance is created with the express purpose of being seen and being believed. While Ellis’s comments retain pertinence for live-action performances, the increasing use of CG characters raises other questions and considerations regarding theory of performance in filmmaking.

Fully CG characters and performance—once thought to be either a dire threat or a complete impossibility—also have become an accepted practice. As

with their human counterparts, they are limited by the quality of the role as developed in the script, the performance itself, and support provided by the other performers and the *mise-en-scène*. Animated characters have a tradition of acceptance. Mickey Mouse, Bugs Bunny, and Lara Croft have legions of fans who are little influenced by the fact that the characters are not “real.” Although a great deal more could be said about why and how animated characters have obtained this acceptance (almost enough for a chapter all of its own), the pertinent issue to address is that CG characters have been subjected to considerably different kind of analysis rather than those created with traditional animation.

Final Fantasy, an entirely CG-generated feature film narrative based on a computer game, represented the first attempt to present fully CG characters as photoreal human character performance. This hyper-real representation drew a great deal of interest simply because it was an attempt to introduce human CG characters and test their acceptance by audiences. Other notable CG performances such as Jar Jar Binks in the *Star Wars* prequel *Phantom Menace*, the Troll in *Harry Potter and the Sorcerer’s [or Philosopher’s] Stone* (2001, Columbus), or the Balrog and Gollum in *Lord of the Rings* did not attempt to “pass for human,” although there was an intention to “pass for real” in the sense that these performances sought to be convincing representations of alien, fantasy monster, or epic fantasy characters. In the case of Gollum, some reviewers consider the performance to be the star role of the trilogy.⁵¹

However, a CG performance is as dependent upon script and direction as any live-action human performance. The desire to create a CG human indistinguishable from live-action performers remains a goal of DVFX, one that is being achieved bit by bit, and in so doing it is creating the cues needed to convince audiences to accept that what they see is so. One way this is being achieved is by subtle manipulations of live-action materials. For example, in *Matrix Reloaded* (2003, Wachowski and Wachowski), Trinity’s stunts involved not only wire removals but also digital extension of her legs to create a smoother line of action. This kind of manipulation is not uncommon and indeed is becoming increasingly prevalent in feature film work and all manner of photographic retouching.

This raises an extensive array of philosophical issues when what we view in images moves from recording to representational technologies, substituting idealized and stylized imagery for the indexical record. In an article in *The Age*,

these matters are raised in relation to the growing use of hyper-real digital models in games, telecommunications media, and photographic stills. The article makes the point that many advertising images have been retouched to the point where the original human image is not necessarily the greater portion of the final product and that, increasingly, our acceptance of these representations informs our expectations of the physical world.⁵²

Needless to say, such factors should be of interest to feminist theoreticians for, as the article in *The Age* notes, “all but one of the digital models (in an exhibition) are women and all of the creators are men.”⁵³ In his discussion of female superheroes in comic books, Bukatman has observed in relation to these characters, “Female desire is absent—when male creators design women characters, they continue to indulge male fantasies. The new power of the female hero is cosmetic surgery, and the halo of power just adds a further level of exoticism to the spectacle of the female form.”⁵⁴ Yet, as discussed in chapter 5, these fantastical images, and their redefinition of expectations, extend male and female performances beyond human physical reality, and they do so with the convincing power of photorealism.

In some respects, this extension is related to one of the earliest digital-visual-effects techniques used to create digital performance—the morph. A morph involves manipulating imagery, which in 2-D is warped and cross-dissolved to conform to another image, or by using 3-D techniques that can be blended with a variety of animation and optical treatments to move from one image to another, and can persuasively represent the concept of shape-shifting and physical transformation of extraordinary magnitude.

Vivian Sobchack and her colleagues have addressed many of the theoretical implications of the morph in *Meta-Morphing: Visual Transformation and the Culture of Quick-Change*. Tracking the conceptual history of the morph from myths about shape-shifting and Cartesian mathematics, the authors identify the morph as significant, pointing to its relationship to wider issues of self-identification and cultural identification in a changing world.

In “Taking Shape: Morphing and the Performance of Self,” Bukatman observes that “morphing is a way of seeing over time.”⁵⁵ He notes that “images of reality, identity, and history are put up for grab” and that “movement becomes *effectively* continuous . . . an act . . . of consciousness.”⁵⁶ The first use of morphing in a feature film was used in *Willow* to represent shape-shifting in the fantasy-adventure films, which was set in a pseudo-mythic time. Accordingly,

its use fit narratively and conformed to a long history of shape-shifting mythologies. Morphing technology made another breakthrough with the creation of the T-1000 Terminator model in *Terminator 2* and its portrayal as a machine that can be what ever it chooses to be, including convincing and superior versions of humans.

Yet as morphing became almost cliché, its use for obvious shape-shifting was restricted to narrative contexts that called for such images. In his article “A Brief History of Morphing,” Mark Wolf noted, “The fantastic nature of the morph and the need to rationalize its occurrence in the narrative have until now limited the genres in which it is found to animation . . . horror . . . and fantasy.”⁵⁷ This bears true for its use as a technique to visualize physical alteration of a character from supernatural causes, however morphs also can be applied to transformations in time and place, albeit usually through a more subtle application of the technique.

Two examples of this technique can be drawn from *Titanic*. In the first, the transformation of an individual in time is demonstrated by the transition from the young Rose posing for Jack Dawson on board the Titanic to the old Rose recounting her experience to the crew of the salvage team. The shot moves from a close up of the young woman’s eye to that of the old woman’s, and along with fine wrinkles deepen to demonstrate the passage of time, and its metamorphosis of the human body, morphing creates a physical linkage for narrative purposes to sell the two actors as one person. That the shot was achieved by digitally integrating the eye of the young actor in the older woman’s face as part of the morph deepens the linkage and the physical bond for narrative as well as representational purposes.

The second example is the set of the Titanic, which twice transforms from old into new and new into old—an image made more poignant by the fact that the footage of the ruin is of the ship itself where it came to rest at the bottom of the Atlantic Ocean. The digital morph between its ruined present and its glorious past give a sense both of travelling in space as well as in time, much as Bukatman has observed the morph has the power to achieve. While such emotive and narrative images have been alluded to in traditionally crafted films through the use of dissolves, the experience of watching the physical transformation of a place, showing the physical impact of time rather than relying on its implication, is wonderfully expressive.

These tools of visual expression that DVFX have brought to filmmaking, thereby extending the traditional special effects practice, are the means by

which filmmaking has become both a recording and a representational art form. Manovich has gone so far as to say, “Cinema can no longer be clearly distinguished from animation. It is no longer an indexical media technology but, rather, a subgenre of painting.”⁵⁸ Although in the past representational art has been recorded in film to create images, many of the images created by DVFX never appear before a camera, even if they do incorporate photographically obtained elements. In effect, the process has been reversed with recording arts media being digitized for representational enhancement.

In an interview included in the *Alien* DVD box set release H. R. Giger, whose art provided the basis for the *Alien* films (1979, Scott; 1986, Cameron; 1992, Fincher; 1997, Jeunet), observed that, “in this century movies are more important than paintings.”⁵⁹ This may be so, not only because they have “exhibition value” as Walter Benjamin has described it⁶⁰ but also because they provide epic scope and a capacity to work in time-based media with all the sensibilities of fine art.

In *Myths To Live By*, Joseph Campbell described the six canons of the painter’s art as defined by the Chinese. These comprise: rhythm, organic form, trueness to nature, color, placement of the object in the field, and style.⁶¹ Each of these canons applies directly to the creation of CG imagery.

In some ways, the evolution of our ability to create convincing CG elements has mimicked natural evolution, and in others it has been reversed. It is fairly straightforward to create a convincing insect, fish, or reptile but still out of reach to create a convincing human being for any sustained period of screen time, although *Final Fantasy* was certainly a brave attempt in this direction. Yet, on the other hand, CG buildings and interiors, vehicles, and other man-made objects are extremely persuasive. It is the elements of nature that have been harder to achieve.

In “The Ontology of the Photographic Image,” André Bazin describes the impact of perspective drawing on art and states, “Thenceforth, painting was torn between two ambitions: one, primarily aesthetic, namely the expression of spiritual reality wherein the symbol transcended its model; the other, purely psychological, namely the duplication of the world outside.”⁶² His discussion is in relation to photography but, with the advent of digitally created images, these ambitions remain of influence. Arnheim also refers to the “striving after likeness to nature which has hitherto permeated whole history of the visual arts. Among the strivings that make human beings create faithful images is the primitive desire to get material objects into one’s power by creating them afresh.”⁶³

This certainly has been an impetus in the development of computer-generated imagery. At the very outset, it was used to visualize leading-edge scientific models for the express purpose of gaining control over the physical world, even if only on a conceptual basis. That the film industry has appropriated the technology to create new worlds, populate those worlds, and manipulate the recorded images of the world in which we live gives support to Arnheim's observation. Stanley Cavell has said that "a painting *is* a world; a photograph *is of* the world."⁶⁴ What then is a digitally enhanced photographic image?

Brian Henderson compared painting and cinema:

Cinema, like painting, is a two-dimensional art which creates the illusion of a third dimension. Painting is limited to its two dimensions; cinema is not. Cinema escapes the limits of two dimensions through its own third dimension, time. It does this by varying its range and perspective, by taking different views of its subject (through montage and/or camera movement).⁶⁵

He went on to observe that:

the difference between montage and collage is to be found in the divergent ways in which they associate and order images. . . . Montage fragments reality in order to reconstitute it in highly organized, synthetic emotional and intellectual patterns. Collage does not do this; it collects or sticks its fragments together in a way that does not entirely overcome their fragmentation. It seeks to recover its fragments as *fragments*. In regard to overall form, it seeks to bring out the internal relations of its pieces, whereas montage imposes a set of relations upon them and indeed collects or creates its pieces to fill out a pre-existent plan.⁶⁶

Yet DVFX rise above these distinctions, allowing composites (collage) to have the impact of montage and for painting to incorporate different views of its subject. The impact DVFX may offer, then, is of a significant order. As later chapters show, for narrative purposes DVFX and the synthesis of recording and representational arts offer new means of expression that allow greater imaginative and expressive means by which to transmit straightforward narrative material as well as complex thematic and conceptual materials.

It may be that one of the impacts of DVFX is the achievement described in "The Work of Art in the Age of Mechanical Reproduction" by Benjamin: "The history of every art form shows critical epochs in which a certain art form aspires to effects which could be fully obtained only with a changed technical standard—that is to say, in a new art form."⁶⁷

Before proceeding to the next chapter, it would be remiss to overlook one of the other major factors in the adoption of DVFX in filmmaking, which is the production benefits and impacts upon the production process itself. As previously mentioned, Bordwell has identified three reasons a technology is adopted: it leads to greater efficiency, it offers an edge in the market through product differentiation, and it allows the product to meet the prevailing quality standards. In the case of DVFX for Hollywood filmmaking, this means that they would have to allow a film to be made more efficiently in terms to shooting time, expense, or difficulty; to be able to point to the effects usage in the marketing of the film; and to support classical narrative traditions. As the discussion has indicated so far, DVFX appear to meet these criteria with ease; in fact, they could not have been better designed to meet the needs of Hollywood filmmakers and, indeed, their development has been driven by the demands of one production after another.

In the first instance, the impact of DVFX on production practice is driven by the script elements. In traditional filmmaking, for example, a shot that calls for a dangerous wild animal to appear in frame with performers might involve staging the shot in such a way that perspective or editing could be used to bring the creature and the performer into the same frame without requiring risky proximity. Using DVFX, the ability to obtain the animal performance and the actors' performance separately and then digitally combine them in an apparently close interaction has a number of distinct advantages. Safety is an obvious advantage, as are the cost efficiencies that might be possible in shooting the animal element in second unit, where the use of a smaller crew and studio environment saves time and money. The main advantage is that the final image, when done well, allows a more convincing and engaging narrative outcome, as later examples show.

As previously mentioned, another major difference in the production process is that, unlike optical work, DVFX are *not* a postproduction practice. Digital visual effects, because they require a different kind of planning than standard postproduction practices—for example, a shooting schedule for the digital production—are part of the initial storyboarding practice and are influential in determining the camera position, movement, and mise-en-scène. These effects can inform production-design decisions on matters including makeup and costuming. They can set standards for props, set construction and design, and set dressing. They also will be the determining factor in deciding which shots are animatronic, which are miniatures, models, and so on. And they

influence direction of actors and stunt work where there are extensive digital components in a scene.

What is fundamentally important is that DVFX are *image creation* and differ very little from physical studio practices. The structuring of a digital studio is very much like the structuring of the work undertaken on a sound stage or on location, although the work is undertaken using computers. Digital crews are set up to create sets, performances, camera, and lighting departments, and their collaboration is very much like that of “real” crews shooting physical elements. The visual effects supervisor on a feature film is a key creative department head ranked alongside the cinematographer and the production designer. This department’s input is as crucial to the realization of the story as the camera and production design departments. If there are digital character elements, then the animators as well as the actors on the set have performances to contribute.

What once might have been an extension of the postproduction process is now a full-fledged production environment that can have more power in determining the conditions and schedule of the physical crew and performers than any other factor in the film. In some ways, the introduction of DVFX can be compared with the introduction of sound. As discussed in chapter 1, it has had similar impact on the physical practices of the set. For example, as with the introduction of sound, in the early days of their use it was common for DVFX to restrict camera movement. However, as the technique and technological prowess of DVFX changed—comparable to the separation of sound recording, mixing, and editing—then digital visual effects allowed for increased camera freedom and expressiveness in the elements that form the final image.

Another factor, based on spectacular DVFX usage, is the box office return. When films converted to sound, box office returns doubled within two years.⁶⁸ However, the box office is not simply the money handed over at the cinema cashier. Box office now takes into account home-viewing rentals and purchases. In a speech to the Screen Producers Association of Australia in November 2003, Mark Pesce reported that DVD sales are higher for films that feature extensive DVFX and that this is influential in whether or not a project will be green-lighted for production.⁶⁹ This point was taken up by *The Guardian*, which reported in January 2005, “More people bought DVDs than cinema tickets last year—and more film flops are turning into hits after being released on disc.”⁷⁰ The article shows that DVD sales in the United Kingdom jumped from 16.6 million sold in 2000 to 197 million sold by 2004, out of a global sales total of

1.9 billion DVDs, figures that do not take into account the “lost” sales of pirated products.⁷¹

As further examples will show, DVFX do not necessarily mean explosions, outer-space fight scenes or 3-D sci-fi environments but, as Pesce observed, the DVD has become a financially powerful delivery mechanism, and DVFX are a key marketing product. This, of course, returns discussion to the point that filmmaking is now a data industry and DVD and digital delivery sales, game spin-offs, and other repurposing opportunities are now a consideration in feature-film production. Indeed, in some cases, the theatrical release is becoming an abridged version of the film, with DVDs offering the full “extended” and alternative versions of the story; the special edition of the *Lord of the Rings* trilogy are a good example of this phenomenon.

Thus the development of DVFX has had impacts upon the production process, changing the way films are planned and shot. They can have either a positive or negative effect on a film’s budget, allowing economies if used judiciously or taking a film’s budget into the history of film financing. They also can influence to what extent the material will have a second life in the DVD and other media markets.

Digital visual effects also have broadened the scope of narrative expression, offering the best of recording and representational tools to storytellers. By extending control over every aspect of the image, DVFX offer additional means of visually representing concepts and creating environments and performances. Their usage is part of the language of cinema, drawn upon by writers in the scriptwriting process, relied upon to find new ways to “show, not tell,” as forthcoming examples reveal. They are accessible to most filmmakers—for even low-to no-budget films—so directors no longer need to have the vision and experience of Kubrick to create visual effects and provide the kinds of *mise-en-scène* that, in the last twenty years, have become integral to the world of film images.

Where Monaco asserts that camera movement equals meaning in film, Bordwell claims that narrative context provides meaning for camera movement. It is narrative context that also provides the function, meaning, and, by and large, motivation for digital-visual-effects usage. This issue of narrative context is the focus of the next chapter.

Digital visual effects, and the processes by which they are created, require us to examine the world around us in the finest detail so that we can better understand how the world works and how it is structured, then use this to imagine

new creations, things we have not seen nor experienced. To create the dinosaurs of *Jurassic Park* or the detailed images of the solar system that are so common to science-fiction films, detailed research must call upon the latest theories and findings of the scientific community. Through this process of researching and imagining, we are again philosophizing and creating in the truest sense of the word. No matter what the dystopian foreshadowings of the T-1000, it is not the machine that is capable of being whatever it chooses to be; we are the ones imagining what else, where else, and who else we would choose to be.

Trick or Treat: A Framework for the Narrative Uses of Digital Visual Effects in Film

With quality movies such as *The Eternal Sunshine of the Spotless Mind* and *Lord of the Rings*, why is there still a perception that there are so few “good” effects films? My own movie experiences argue against the view that it is sufficient for a movie to have good effects. And I certainly consider mainstream films that do not have the story elements in place to be extremely disappointing, no matter how impressive the effects or the box office earnings. Given that there is a wealth of information that describes the structure of the classical narrative, the problem with films that fail cannot be that no one knows how a story should be crafted. And there is an impressive track record of extraordinary technical achievements in the craft of digital visual effects. So why does this perception persist? In my view the crux of the problem lies in how digital visual effects are used in the storytelling.

A tension exists between the narrative intents of DVFX creators and the perceived value that effects offer in terms of spectacularity. The question of whether DVFX are capable of serving traditional narrative practice given their perceived inherent spectacularity must be confronted. As later discussions of the literature on science fiction shows, special effects are still considered to be “special,” identifiable, and it is argued that they single themselves out as apparent to the spectator. However, evidence suggests that the narrative uses of DVFX moves them away from this “specialness” and inherent spectacularity.

In his paper, “True Lies: Perceptual Realism, Digital Images, and Film Theory,” Stephen Prince argues that digital effects raise new issues about realism and the photographic image because DVFX are not always apparent and because, by their digital nature, digitally composed images challenge the ontology of