Visual Effects and the Test of Time

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Chapter 1: Introduction and Background

Visual effects have been a part of filmmaking for almost as long as the art form has existed. In fact, motion picture projection itself is a form of visual trickery. Cinema as we know it is not truly a moving image; it is a series of still frames played in timely succession. The illusion of movement comes from the way our minds store each image until the next “overwrites it.” This phenomenon is called the persistence of vision. Adding supplementary “special effects” to motion pictures served only to further this illusion of seeing a real, moving picture. The illusion of movement quickly became old hat, and filmmakers responded by seeking new methods to “wow” audiences. Georges Méliès was one of the first to do this, most famously in his 1902 film _A Trip to the Moon_. In the film, he cut together similar, but slightly different, pieces of film to give the illusion of people and objects disappearing from the frame. He also used matte paintings (like those used in theater) to give the illusion of a fantasy world (Netzley, 2001).

As the years passed, visual effects and their complexity grew exponentially. Filmmakers expanded on clever editing and matte paintings with models and miniatures, stop-motion animation, hand-drawn animation, and matte-based compositing. Only 31 years after Méliès’ landmark film, director Merian C. Cooper and stop-motion animator Willis O’Brien changed the landscape of effects forever with the epic fantasy adventure film _King Kong_. _King Kong_ featured heavy use of matte paintings and stop-motion animation (composited with live action) on a scale never
seen before. The character of Kong was the first stop-motion central character in a film. Stop-motion animation is the process of positioning and photographing a model one frame at a time. When the still frames are played in succession at the normal film rate of 24 frames per second, the model appears to move on its own. The formula used in Kong (the use of many different types of effects to make complex composited shots) is the basis for the way large-scale visual effects are done today. O’Brien’s apprentice, Ray Harryhausen, created iconic stop-motion animation starting in the late 1940s that served as an inspiration for many future effects-filmmakers, such as Steven Spielberg, George Lucas, and James Cameron. These filmmakers built on this special effects inspiration and incorporated digitally-altered imagery into their films. The birth and rise of digital imagery began a slow transition from all practical to all digital effects (Rickitt, 2007).

1.1 The Digital Revolution (of Effects Films)

With the advent of computer technology, the entire filmmaking process has gone digital. Though many films are still shot on 35mm film, an increasing number are shot on high-resolution video formats. Most other parts of the production process are entirely digital, including sound, editing, and of course, visual effects.

The types of digital and practical trickery are diverse beyond words. While the entire process is not always digital, it is largely driven by computer technology. The
proliferation of computers and software has led to a huge increase in the number of films driven by and featuring visual effects. Ever since the so-called “Digital Revolution” of visual effects, visual effects-driven blockbuster films have been the primary force driving the effects industry forward.

Although many pre-Digital Revolution films contain significant and important examples of digital visual effects, this thesis will discuss only films made during or after the Revolution. Most pre-Revolution films used digital effects very sparingly, limiting them to a single shot or sequence, such as the water creature in *The Abyss* (1989) and the glass knight in *Young Sherlock Holmes* (1985). Other films used digital effects in a manner that did not relate to a realistic environment or character, such as the wireframe sequence in *Star Wars* (1977) and the robot vision in *Westworld* (1973).

The Digital Revolution started with the 1991 science-fiction action film *Terminator 2: Judgment Day*, directed by James Cameron. *Terminator 2: Judgment Day* was the first film to truly integrate digital effects over a large portion of the film, as well as the first to integrate the effects with the story on a large scale. It is a sequel to 1984’s *The Terminator*, which is about a man from the future who is sent back in time to protect a woman from a deadly cyborg. The cyborg (the terminator) is a bipedal robot covered with human tissue, giving it the appearance of a human. Late in the film, its skin is burned off, leaving only the metal skeleton. Still very much alive, the skeleton continues to chase after the characters. These shots were accomplished with a stop-motion animated model, just like in *King Kong*. 
However, there are two cyborgs in The Terminator’s sequel. The endoskeletal model from the first film returns, but the newcomer, a liquid metal killing machine, sparked the Digital Revolution. It could also imitate other humans, as well as turn its appendages into metal weapons and its entire body into a reflective liquid metal blob. More importantly, these transformations occur frequently throughout the film; there is no one distinct lead effects sequence. Another important aspect of this film is that Cameron did not film the effects scenes to show off the effects; the visual effects shots integrate naturally with the rest of the shots (Netzley, 2001).

Beyond the naturalistic cinematography, the number of shots with advanced computer-generated imagery was much higher than in any other film to date: 44 (Netzley, 2001). Other firsts include the first realistic computer-generated humanoid character, the first use of reflection mapping to simulate environmental reflections from the liquid metal robot, and the first morph from a computer-generated character to a live character (Sobchack, 2000). Finally, all of these amazing digital effects shots intercut seamlessly with practical effects shots (miniatures, models, puppets, etc.), minimizing the need for CGI (Netzley, 2001). All of these facts combine to make a legendary visual effects film.

This was the first film to heavily integrate digital and practical effects on a large scale. It planted the seed that Jurassic Park (1993) would later sow, convincing the world of the effectiveness of computer graphics as a visual effects tool. Other films followed: Forrest Gump (1994), Apollo 13 (1995), Babe (1995), and Independence
Day (1996) each contributing new and stunning combinations of digital and practical visual effects. After these films, digital visual effects became fully mainstream, appearing in smaller-budget films, in addition to the aforementioned blockbusters, and not always overtly.

1.2 Visual Effects in the Mainstream

Visual effects-driven films face a lot of criticism in mainstream movie reviews. Critics fault the focus on effects rather than story. For example, in Roger Ebert’s review of Michael Bay’s 2001 film Pearl Harbor, he cited that many of the effects were redundant, suggesting that perhaps they were added to show off the effects rather than the realism of the events happening. He wrote, “What is the point, really, of more than half an hour of planes bombing ships, of explosions and fireballs…?” (Ebert, 2001). This is not always the case. Many films are applauded for solid visual effects, and are honored by both critics and audiences, becoming classics not only for cutting-edge technology, but integration into story. But how does the audience differentiate between “good” visual effects and “bad” visual effects? My goal is to examine both the technical requirements for good visual effects and, more importantly, the pivotal importance of the story and characters as they relate to visual effects. By analyzing these requirements, we can learn what makes visual effects withstand the test of time.
Chapter 2: The Visual Effects Process

Visual effects start with a story that has a need for enhancing or escaping reality. During the early preproduction meetings for a film, major department heads from all facets of filmmaking plan the primary stages. For visual effects, the department head is the visual effects supervisor. The visual effects supervisor reports directly to the producers and director, and is responsible for achieving the visual effects as per the director’s vision. The visual effects supervisor holds both a creative and administrative position on the film crew. He or she oversees both the shooting of the effects scenes on set and the creation and assembly of all digital elements in post-production (Goulekas, 2001). The following is a description of the visual effects process for film.

2.1 Planning

The visual effects supervisor must work with the film’s producers to bid out the workload to one or more visual effects companies, referred to as “effects houses.” In addition to the film’s primary visual effects supervisor, each house as its own visual effects supervisor. If multiple houses are employed to create the effects, the (primary) visual effects supervisor is in charge of keeping a uniform style between companies that fits the director’s vision. The managing of multiple companies is a major potential trouble area. Many companies have their own distinct style or specialty. However,
with proper planning and direction, multiple companies can achieve a cohesive style for a film.

2.2 Conceptual Design

After the producers, director, and visual effects supervisor have planned the production, the conceptual design phase ensues. In this phase, the film’s effects scenes are isolated and planned out one at a time. Artists at the effects house(s) begin to create the designs for characters, environments, and other effects, under the guidance of their company supervisor. Typically, artists use traditional art methods, such as sketching, drawing, painting, and sculpting to create these initial designs. The director and effects supervisor oversee this process to finalize character models, digital props, environments, and other elements (Allen and Connor, 2007).

2.3 Previs

The previsualization process ("previs") occurs concurrently. Previs is the process of blocking out the pacing and style of effects sequences, as well as planning their cinematography. Often, an independent artist or company is hired to do previsualization with the director and visual effects supervisor. Previsualization is the digital equivalent of storyboarding. Though it is a 3D animation, the visual quality is very low. Quality is not the point. Previs makes use of the most basic 3D models and
animation; the purpose is to establish the look and feel of the sequence. Scenes are laid out, shots are planned, camera moves are tried, and character blocking is approximated. This gives the director and visual effects supervisor the opportunity to see a very rudimentary and early version of how the scenes will play. This can help with the decisions being made for the on-set shoot, as well as the decisions for the CGI. Previs is not limited to CGI. Many directors, such as Peter Jackson, shoot video storyboards of work-in-progress sets and miniatures with a digital camcorder. This footage is intercut with CGI previs to provide an early build of a scene (“Previsualization,” 2005).

2.4 On-set Shoot

The next stage is the on-set shoot. This is where the visual effects move from preproduction to production. During this stage, scenes that require visual effects are shot as part of the normal production shoot. The on-set shoot depends heavily on the particular film. Though there is a reasonably finite set of specific methods for achieving certain shots, there is no way to list every trick used on-set to achieve those methods, because there are hundreds if not thousands of techniques used to achieve an uncountable number of different things. The applications of visual effects are only limited by writers’ imaginations. The methods used depend on several factors. The visual effects supervisor must take into account just what the finished product is
supposed to be when deciding what methods to employ on-set. Some of the most
common methods include:

1. Using models and miniatures to represent larger or fantastical buildings or
   objects
2. Using matte paintings to replace backgrounds
3. Shooting actors against bluescreen or greenscreen, and later removing that
   flat color (in a process known as “keying”) and replacing it with a matte
   painting, a miniature, GG, or any combination thereof. Each element in this
   process, including the actual blue/greenscreen footage, is called a “plate.”

These major standards represent only part of the process of a successful on-set
shoot. Many things must be planned carefully during the production phase for a
successful post-production. Models and miniatures must be carefully designed to
match the style of full-size set pieces used in the shoot. The same is true of matte
paintings. For blue/greenscreen shots, lighting must be carefully matched to the
background plates. Any shots that will be integrated with CG must be carefully set up
to ensure the possibility of matchmoving. Matchmoving is the process of matching
CG and other digitally composited elements to the camera’s movements on set. To
accomplish this, sets must be carefully surveyed. All camera data must be recorded,
such as lens focal lengths, lens aperture, and frame rate. The camera’s motion must be
recreated as well, whether by means of motion control (which records the camera’s
exact movements, so they they can be recreated physically or digitally) or through
sophisticated camera-tracking software in postproduction. Notes are also taken about
the position, brightness, and color temperature of lights. The size and shape of sets are
often recorded by means of HDR (high dynamic range) panoramic photography (Allen
and Connor, 2007).

The on-set shoot is also where practical special effects and digital effects often
meet. Shots requiring wire rigs, miniatures, explosives, and other practical elements
are often co-supervised by special effects and visual effects teams. Complicated shots
often have hundreds of elements to be composited. For example, one complicated shot
from the 2006 film *Casino Royale* depicts a Venetian villa collapsing into the Grand
Canal. The finished shot includes a live background plate shot on location in Venice.
The miniatures department built a 1/3 scale miniature of the villa, as well as
recreations of the surrounding villas. The villa was rigged to sink into an 800,000
gallon tank at Pinewood Studios in England. The miniature villa rig was filmed
outdoors, against bluescreen. This was composited over the live plate of Venice. But to
successfully sell the shot, the production also shot extra elements of water splashing
and dust clouding. Also, in the live plate, the director was unhappy with the
performance of some of the onlooker extras. To solve this problem, the production
filmed actors against bluescreen to composite over the on-set extras (Fordham, 2007).
I will discuss the compositing process in greater detail later, but this illustrates all of
the stages of effects production and how much departments rely on one another to
create special and visual effects (Duncan, 2008).
2.5 CG Animation

The next major stage of the visual effects process is the creation of computer generated imagery, referred to as CGI. CGI is a term for the imagery itself; CG describes whether an image or element is computer generated. The use of CGI is not necessarily intrinsic to the modern effects process. However, it is so prevalent in modern films that it might as well be. The CGI process begins in the conceptual design phase, but does not end until well after the production phase wraps. As previously discussed, the conceptual design phase traditionally involves traditional art methods. However, at the same time, the 3D modeling process begins. 3D modelers work with the art department to evolve their designs. On many films, the art department’s sculptors will create maquettes of objects, creatures, and characters to be scanned into 3D models (Woody, 2007). These scans will then be tweaked and finalized in the 3D modeling software. Scans of people and animals are often called “digital doubles” because of their resemblance to their real-life counterparts. The finishing of the design phase tends to occur shortly after the conclusion of on-set shooting.

Before animation can take place, a process called “rigging” must occur. Rigging is the addition of a skeletal and muscular structure to a 3D character model, which provides the means to animate the model. The skeleton, complete with its joints, provides a set of natural motions and limits so that the animators can focus on
animating, rather than anatomy. After modeling and rigging, animation begins. Animation, of course, refers to the process of turning 3D objects into characters who act along with the live action. There are several methods of animation. Keyframe animation emulates traditional hand-animation. Animators set the characters in poses for important moments, and the computer interpolates the motion in between keyframes. In certain situations, such as when using digital doubles, animators use motion capture animation. In this process, actors wear a suit with tracking markers. Special cameras track the markers and apply their motion to a 3D model, creating an almost exact representation of the actors’ movements. After animation, the animated elements are lit and rendered. The animation is rendered in layers, which are sent to the compositors (Rickitt, 2007).

2.6 Compositing

Compositing is a critical step in the process. Compositors assemble all of the pieces of visual effects and create the finished, presentable image. Heretofore, visual effects shots are just pieces, consisting of 3D models and animations, bluescreen footage, photographs, matte paintings, miniatures, etc. Early composites give the first impression of how shots will appear in the finished film. Compositing is vitally important, not only because the process layers all the effects into a presentable shot, but because the compositing process is also used to fix and polish any problematic elements. Compositing can be broken down into two separate processes: fixing and
layering. The fixing work is done by rotoscope and paint artists. Rotoscopying (also called painting) is the process of altering footage frame by frame, usually to create mattes or to fix problems. Roto/paint artists are responsible for painting out wire rigs, keying bluescreens, removing errant crewmembers/equipment, and creating mattes that define how layers interact with each other (Wright, 2008). The compositors then assemble those pieces, carefully matching color and light levels, and assuring that all motion tracking works correctly. They layer in CG render passes, miniatures, matte paintings, and additional elements as needed to complete the shot. Complicated shots involve the layering of dozens—or even hundreds—of elements. The compositors maintain control over every element of each shot; at any point, they can go back into the composite and tweak the different parts independently. After each shot is finished, it goes on to final color grading (Wright, 2008).

2.7 Color Grading

The final stage is color grading. Sometimes, compositors perform this role. Some films have a dedicated colorist. This process involves going through the film shot-by-shot and tweaking colors. Colorists can enhance a verdant spring countryside or dull a drab war scene. This process is also used to bring added focus to certain elements in a picture to increase or diminish emphasis, typically by altering the brightness and contrast of certain parts of each shot. Two of the first films to be
entirely digitally color corrected were *Le Fabuleux Destin d’Amélie Poulain* and *The Lord of the Rings: The Fellowship of the Ring* (Vanderschelden, 2007).

### 2.8 Classifications of Effects

With so many stages, it is no wonder that the process goes awry sometimes. Very few films even come close to being “perfect”—and I use that term lightly. However, what is passable to a modern audience is considerably less than what this author considers “perfect” or even “good.” This paper will refer to “good” effects as those that are visibly well planned and executed in a technical sense. It will not have anything to do with whether the effects helped the story, or if they drew too much attention to themselves. Good effects are those that are technically proficient for the time in which they were created.

Since we are examining only films made after the Digital Revolution of the early 1990s, all “good” effects films feature convincing, believable CGI. CGI can include main, secondary, and tertiary characters, objects/props, and full environments, as well as an abundance of other elements. The films cited earlier in this paper feature relatively simple CG enhancement. *Jurassic Park* (1993), for example, featured dozens of CG dinosaurs, and some other 2D enhancements, such as the addition of atmospheric effects to shots with CG characters and face replacement of stunt performers with actors. The film featured no CG environments or particle effects.
(complex CGI simulations of elements such as dust, clouds, smoke, fire, or water).

*Terminator 2: Judgment Day* (1991) featured a humanoid CG character, which was a significant achievement at the time, but the character had a very simple, reflective chrome texture, partially due to story requirements, but also due to limitations with rendering skin and clothing textures. The film’s digital effects are limited mostly to the liquid metal character in its various manifestations, as well as its morphing into live characters. The effects were quite extensive for the time period, but are very simple by today’s standards, especially where overall shot count is concerned. Later films feature more complex effects, and a much larger effects shot count, but they are held to the same standards for being “good.”

“Bad” visual effects films are those that falter in their design and execution on a technical level. Bad visual effects can come from unrealistic models and/or animation, unrealistic rendering, bad lighting of on-set elements, or, perhaps most commonly, poor compositing of the final elements. Of course, with improper planning and design, any of these stages can go wrong. However, it is this author’s opinion that certain stages are more important than others for creating “good” effects, and with special emphasis in those certain stages, bad effects can be saved, and simple effects can sell a shot better than complex effects in some situations.

One common issue is unmatched exposure between elements shot on bluescreen and background elements. For example, early in the 2004 film *The Day After Tomorrow*, several characters drill holes into an ice shelf. The production filmed
actors against a bluescreen, and compositors replaced the bluescreen with a large
digital matte painting. The lighting on the actors does not match the lighting in the CG
matte painted background. Photographers know that the human eye does not register
light exactly as film does. In certain situations, what humans see with their eyes is
very different from the way it actually looks in real life, which is what the film
records. If an artist composites a shot based on how he thinks it would look to his eye
in real life, it will not match what it would look like if it had been shot on film
practically with no visual effects. This is a common occurrence even in large-scale
visual effects films. Several films analyzed in this thesis have examples of poor blue/
greenscreen lighting: *The Lord of the Rings*, *The Chronicles of Narnia*, and *The Bucket
List*, in addition to *The Day After Tomorrow*.

“Good” versus “bad” is, of course, an incredibly subjective area. My
definition of “good” boils down to a shot’s realism in the context of a film’s style. But
who is to say that what is realistic to me will be realistic to someone else? There is a
great deal of incidental opinion with visual effects. In addition, in an age of easy
repeat viewings, viewers have a lot more chances to restudy and find faults (and
strengths) in visual effects. Before films were readily available on home video, a
viewer might get only one chance in his or her life to see a particular film. Many
imperfections in visual effects pass unnoticed on one’s first viewing of a particular
film. Noticeably bad composites and CGI aside, small shot-to-shot issues only become
apparent with repeated viewings. For example, in the film *Children of Men*, one of the
film’s most successful shots contains a simple rotoscoping error. Played through frame-by-frame, one can see a sign through the explosion, an element which should have been layered behind the explosion. This is not indicative of the film’s overall effects success; quite to the contrary, it is a very successful effects film. Visual effects are held to higher standards due to the availability of home video. As a result, “good” versus “bad” becomes a slightly more objective issue, as the quality of effects shots can be reviewed closely, whereas before their quality was decided only by the impact of the initial viewing.

“Invisible” versus “overt” is not a subjective judgment of quality. It refers more to the intended visual effects style of any given film. “Invisible effects” are those that are meant not to be noticed. If done well, viewers may well never know that the film uses visual effects. “Overt” visual effects are those that shamelessly draw attention to themselves. Neither one is better than the other; it depends on the plot and the film’s production quality (cinematography, lighting, acting, directing choices, and editing). Either type, used effectively, can make for satisfying visual effects.

There is an important distinction between “invisible” and “good.” In general, well-done effects will not distract the viewer from the story unfolding onscreen. It is quite acceptable for viewers to know that the film uses visual effects. Overt visual effects—if used properly—can create a sense of wonder and splendor. In effect, they can draw the viewer in to the scene just as well as invisible effects. For our purposes,
we must define the difference between “good versus bad” and “invisible versus overt,” using examples from post-Digital Revolution films.
Chapter 3: Deep Analysis of “Good” and “Bad” Effects Films

The purpose of this chapter is to analyze several films to illustrate and discuss the points covered in the previous chapter. First: what makes a “good” effects film? In the previous chapter, I stated that a “good” shot depended on the effects’ realism in the context of a movie with a photorealistic visual effects style. The level of subjectivity increases in films with more stylized visual effects. However, I am prepared to assert that most mainstream visual effects-driven films, while not necessarily realistic or plausible in nature, are rendered in a photorealistic style, as opposed to being rendered in a stylized manner. For example, Transformers features giant, alien robots that are absurdly implausible in concept, yet achieved with stunning photorealism. They look almost entirely real, though no viewer would be fooled into thinking that the filmmakers built real, transforming robots (see figure 3.1).

Figure 3.1 — A CG robot bursts from the sand (Transformers, 2007).
But what is a “good” effects film? What does it take to make the body of effects of an entire film “good?” Most films have successful and unsuccessful effects shots. Most visual effects shots are very complex; they contain dozens or sometimes hundreds of layers and elements that must work seamlessly with each other. Unsurprisingly, minor missteps often occur, particularly because many visual effects-driven films have hundreds upon hundreds of these complex visual effects shots. A film does not need to have few or no mistakes to still be a good effects film. However, there are films with very few discernible “mistakes.” To illustrate these points, I have analyzed several films that include visual effects to varying degrees. I have paired the films together, which will demonstrate the importance of certain concepts through comparison. Furthermore, these analyses discuss which films’ effects stand the test of time.

3.1 Comparison 1: Digital Revolution Films, Overt Versus Invisible

My first pairing is two films that defined the digital revolution in visual effects that occurred in the mid-1990s. Jurassic Park and Forrest Gump, produced in 1993 and 1994, respectively, are two of the best examples of visual effects that stand the test of time. Jurassic Park was the first film to achieve large-scale photorealistic CG creatures. Forrest Gump used digital compositing to achieve a variety of unique shots, including the insertion of the main character into familiar historical footage. These two films used effects in completely different ways. Jurassic Park’s dinosaurs were very
overt and noticeable. Viewers knew that they were seeing a digital creation, no matter how realistic the presentation. *Forrest Gump* relied mostly on invisible digital compositing tricks; for that reason, many viewers had no awareness of the extensive visual effects. Each film was a mainstream and critical success, garnering over 80% positive reviews from top critics (“Jurassic Park Movie Reviews, Pictures - Rotten Tomatoes,” n.d.) (“Forrest Gump Movie Reviews, Pictures - Rotten Tomatoes,” n.d.). Each also won the Academy Award for Best Visual Effects.

**Jurassic Park (1993)**

*Jurassic Park* is a 1993 Science Fiction/Action film directed by Steven Spielberg. Based on a book by the late Michael Crichton, the film is about scientists successfully creating dinosaurs in a lab environment, then attempting to open a theme park centered on them. Far from the first film to feature dinosaurs as a visual effect, it broke new ground as the first to feature CG dinosaurs. Spielberg originally planned the production around the use of full-scale animatronics (created by Stan Winston) and go-motion dinosaurs, to be created by Phil Tippett’s studio (“The Making of Jurassic Park,” 1994). Go-motion, like stop-motion, is an animation technique that involves the manipulation of mechanical models to create the illusion of motion during the playback of individual still frames. Go-motion differs from stop-motion in that the models are actually in motion when photographed; the resultant motion blur furthers the illusion of motion (Rickitt, 2007).
Early tests of go-motion dinosaurs satisfied Spielberg, but it was the film’s visual effects supervisor, Dennis Muren, who suggested an alternative. Muren asked Spielberg if he would consider letting Industrial Light & Magic, hot off the success of *Terminator 2: Judgment Day*, attempt to create the dinosaurs with CGI. He believed ILM could achieve the realism that Spielberg wanted more completely than with go-motion. ILM had originally been hired to digitally composite the various physical effects elements, including the wide shots that had been planned with go-motion in mind (Netzley, 2001). ILM created several tests to convince Spielberg that the effects technology was ready for the huge project. For these tests, they scanned clay models of dinosaurs, creating digital models that provided an exact representation of the sculptors’ work. Two scenes were test-animated: a tyrannosaurus rex walking along a path and a herd of gallimimus running. These two tests persuaded Spielberg to use CGI extensively in the film. Upon delivering the news to Tippett, Spielberg said, “You’re out of a job.” He retorted, “Don’t you mean extinct?” The line was written into the script (“The Making of *Jurassic Park*, 1994).

As artists at ILM became more confident with their ability to deliver photorealistic dinosaurs, the creatures were given a greater on-screen presence. More and more shots that had been planned as animatronics shots were awarded to ILM. The result rewrote the book of visual effects history. According to Rickitt, “*Jurassic Park* was the film that finally convinced the world that the computer was the effects tool of the future” (Rickitt, 2007).
Obviously, the film revolutionized the use of computer graphics in film. More importantly, the effects are still convincing 16 years later; therefore, they stand the test of time. The technical elements are all in order: lifelike models and textures, believable animation, and attention to detail in compositing. Furthermore, the film’s cinematography aided in the production of realistic visual effects. They filmed scenes and plates as if there were an actual, live dinosaur present. This adds to the credibility because the process does not call any more attention to itself than it needs to. All of the film’s effects sequences were filmed in this realistic style.

The film’s visual effects shot count is very low by modern standards: just 52. For comparison, *The Lord of the Rings: The Return of the King* had approximately 1500 visual effects shots (“The Passing of an Age,” 2004). Phil Tippett’s studio supervised ILM’s animation of 15 shots involving the T-Rex escaping the paddock and two raptors stalking the children in a kitchen. Tippett and his go-motion animators had done extensive research on dinosaur movement and behavior, and even though the film would no longer incorporate his go-motion animation, Spielberg wanted to take advantage of the research his team had done. They also developed the Dinosaur Input Device, which was an interface to manipulate and animate 3D computer models in a more traditional fashion. The device looked like a go-motion model, but as animators moved the device, the movements were recorded into the computer’s animation software. This allowed Tippett’s traditionally trained go-motion animators to apply their skills to the modern CGI dinosaurs (Netzley, 2001).
The 37 remaining shots fell to the animation team at ILM, which, according to Rickett (2007), included the initial brachiosaurus sighting, the brachiosaurus herd, the gallimimus stampede/T-Rex attack, and the final confrontation with the velociraptors and the T-Rex. Each scene exhibits stunningly realistic CGI, especially when compared to other CGI in films at the time. The brachiosaurus sighting near the beginning of the film features a relatively simple model and texture, but the animation is very naturalistic. It moves like an animal, not like a monster. Spielberg stated that he wanted to portray dinosaurs as animals, not monsters (“The Making of Jurassic Park,” 1994). He instructed the animators to bring the creatures to life in this fashion. The attention to detail is strong: the animal casts a realistic shadow, and it realistically interacts with a tree in the scene. No less important is the application of sound in the scene. The dinosaur’s wails and footsteps are reflective of the size of the creature, and do not sound like any currently living animal.

The tyrannosaurus’ first appearance is one of the most famous visual effects sequences of all time. This scene represents a marriage of several effects techniques, and each adds to the scene. The first shot of the dinosaur is a full-size animatronic, of which only the head is seen (see figure 3.2). The creature appears to eat a goat, introduced earlier.
Then, after a tension-building montage showing the electric fence failing and being pulled off its towers, a full-CG tyrannosaurus walks out on to the main road and roars. This shot alone is a legendary piece of visual effects history. Despite the relatively simple model and animation, it is again the attention to detail that makes this shot and sequence stand the test of time (see figure 3.3). The cinematography is from a human perspective. The dinosaur, walking in pouring rain, has shiny reflections from the lights. The compositors inserted rain and mist in front of the dinosaur, which greatly helps it to blend into the scene. Each time its foot strikes the ground water splashes up around it. With each step, the camera appears to shake, accompanying the satisfyingly loud thump of impact. The roar is loud and distinctive. Thorough and realistic compositing is what makes these CG-enhanced shots realistic even 16 years later.

Fig. 3.2 — Animatronic tyrannosaurus (*Jurassic Park*, 1993).
However, not every shot of the tyrannosaurus is CG. The scene freely intercuts between the CG dinosaur and the full-size animatronic. The CG version matches the movement and the appearance of the animatronic very closely. It served as a reference for the animation, rendering, and compositing teams. Spielberg chose to use the animatronic because it served to be more realistic in certain shots. Although, as I stated earlier, ILM found its ability to create realistic shots to be much stronger than initially expected, the filmmakers still shot most of the tyrannosaurus close-ups with the animatronic. Stan Winston and the full-size dinosaur team knew they could evoke certain types of performances out of the robot, and the appearance held up very well, even with the camera just feet away from the contraption. Subtle details, such as eyes with robotically dilating pupils, added to the sense of realism. The rig could perform 57 different functions, and could be controlled in real-time with a miniature version of

Fig. 3.3 — CG tyrannosaurus composited into a live environment. Note the splash by its foot, and the reflection from the lightning on its back (Jurassic Park, 1993).
the armature (not unlike the Dinosaur Input Device used by the animators—see figure 3.4), or preprogrammed movements (Rickitt, 2007).

The filmmakers approached the creation of CGI with a firm basis in tried and true traditional techniques. The CGI shots were meant to stand up in sequence with animatronics shots, a goal that was absolutely met. It is often difficult to tell which shots were animatronics, and which were CGI. The film’s visual effects success was also aided by the fact that while ambitious and innovative, the overall scale of the film’s effects is quite small by modern standards. An extraordinary amount of planning, execution, and polish went into each of the 52 digital effects shots. Furthermore, the filmmakers did not let the visual effects drive the cinematography. Had the film used entirely non-digital effects, its cinematography would have appeared largely the same. As stated earlier, CGI did enable Spielberg to include some

Fig. 3.4 — Animatronic tyrannosaurus, controlled via armature (Jurassic Park, 1993).
previously unplanned shots, such as when the unfortunate Gennaro was eaten straight off a toilet by the tyrannosaurus (see figure 3.5). This overt effects shot helped sell the illusion of the character’s demise, whereas before, the shot would have been a series of cutaways, rather than the final, seamless shot.

It is this combination of innovation, restraint, and reliance on traditional techniques that made *Jurassic Park* such a lasting success. The restraint was perhaps born of necessity, due to restrictions of CG technology, or fear that the CGI would not look realistic. But the resultant combination of different special effects techniques, finding the best technology for each shot, which sealed its achievement. *Jurassic Park* is undoubtedly one of the best visual effects films of all time.
**Forrest Gump (1994)**

*Forrest Gump* is a 1994 comedy/drama about an intellectually challenged man’s epic life journey, meeting great historical figures and witnessing several important historical events, despite being relatively unaware of their significance. The film featured extensive visual effects work, mostly in digital compositing. Without any significant CG creatures or objects, the film’s effects are about as far from *Jurassic Park’s* as they could be. The film’s major compositing-driven sequences include the incorporation of the main character into familiar historical footage, the removal of a character’s legs to make him appear to be an amputee, and the replication of a small group of extras to simulate a large crowd. The film did feature some very subtle CG enhancements: a digital ping pong ball for Forrest’s tenure as a world champion ping pong ball player, and an animated feather floating on the wind, which bookends the film and portrays an important metaphor in the story.

Forrest Gump interacts with several historical figures, meeting a number of presidents and celebrities, along his life’s journey. The filmmakers shot actor Tom Hanks on a bluescreen, choreographing his actions to match the historical footage, then composited him into the footage. This is clearly the film’s most overt effect, since audiences know that Tom Hanks could not have interacted with these figures, most of whom are deceased. However, despite their overtness, the artists took care to match the footage of Hanks with the historical footage very closely. They degraded the film, matching the old footage’s grain and black and white contrast and tracked the
character to match the (old) camera movement. The result of this process stunned audiences: it looks like Tom Hanks shook hands with John F. Kennedy, Lyndon Johnson, Richard Nixon, and sat with John Lennon (see figure 3.6). The final flourish was manipulating the historical figures’ mouth movement to make it appear that they were speaking to Forrest. This is the least successful of the digital tricks—it calls a bit too much attention to itself as an effect, because the audience can easily detect the manipulation.

The rest of the film’s effects are virtually unnoticeable as effects sequences. The most complicated of these was the digital removal of Lieutenant Dan’s legs, an effect achieved so convincingly that a basic web search reveals that even today many people believe that actor Gary Sinise actually has no legs. Lieutenant Dan, suffers severe injuries in Vietnam, requiring the amputation of his legs. The filmmakers wrapped his legs in blue cloth, then painted out (using rotoscoping) the blue frame by frame, replacing it with a clean plate of the background. Visual Effects Supervisor Ken Ralston carefully constructed the sequence to invisibly and subtly help the shots’ believability. The sequence is filmed as if Gary Sinise were an actual amputee; there
are no shots to specifically show off the effect. However, in choreographing the character’s motions and dressing the set, several “impossible” events sell the shot, mostly involving Sinise swinging his legs through an open space where an object such as a table or railing was later digitally composited over the space (see figure 3.7). These subtle additions never call attention to themselves; they are subtle signs of realism that go unnoticed.

Another effective invisible effects scene shows Forrest Gump making a speech at the Lincoln Memorial in Washington, D.C. during a large anti-war rally. In the film, the Washington Monument’s reflecting pool is completely surrounded by protesters, who appear to number in the thousands. The filmmakers filmed a small group of extras bunched in the foreground, while Tom Hanks walked onto the stage. They proceeded to move the extras to different quadrants around the pool and filmed them with a camera move identical to the first. These shots were later composited together, showing all of the quadrants of people.
To deal with the fact that the sky changed for each shot, the entire sky was replaced by a digital matte painting. As a final touch, the reflection of the Washington Monument was painted onto the pool, as the reflection came and went over the course of the day’s filming. This conceptually simple visual effects shot sold the scale of the rally. It enhances an important scene for the story and stands the test of time because of its simple, effective execution (see figure 3.8).
The most complicated effects sequence in the film is the compositing of a feather, which floats down from the sky at the beginning of the film and lands on the main character’s shoe. Though simple in concept, the execution of the shot grew complicated because at the end of the shot, Forrest picks the feather up and puts it in his book. Obviously, he had to pick up a real feather, but to control the flight, it had to be an animated feather. The start of the composite was simple enough, wherein a feather was shot against bluescreen on a wire rig. With the bluescreen and wire rig removed from the shot, the feather was placed over a plate of a descending crane shot. The complication came from erasing the real feather from Hanks’ shoe and blending a new CG feather with it, which Hanks then picks up (“Behind the Magic of Forrest Gump,” 1995).

The film’s CGI follows the example set by the other digital effects: simple, solid execution to illustrate the story effectively. Although Tom Hanks is a competent ping-pong player, he was not good enough to portray the world-champion skills of his character. Using a metronome, Hanks feigned the motions, keeping in sync with the speed of a world-champion player. A simple CG ball was animated to match Hanks’ and his partner’s motions (see figure 3.9). A vital component to the shot was the addition of motion blur to the animated ball. Since a real ball would move a considerable distance during each frame’s exposure, the CG ball had to be similarly blurred during each frame. Simple ping-pong sound effects complete each shot (“Behind the Magic of Forrest Gump,” 1995).
The effects of *Forrest Gump* are relatively simple in concept, but were used to create completely original shots that had not been attempted previously. Furthermore, they are largely invisible and unnoticeable. More importantly, none of the effects were done for effects’ sake. There are no shots whose sole purpose is to show off technology. The story, however, benefits from the effects utilized, because the character Forrest Gump gets into situations that would be difficult to film without the use of digital effects. Furthermore, the scale of the effects is quite small by modern standards. Computing power was much more limited in 1994 than it is today, and thus, the filmmakers were restricted to far fewer shots than in modern films. That is not to say that *Forrest Gump* would have had more effects shots were it remade today; the film does not need any more effects shots. But with massively increased computing power and hundreds of visual effects companies around the world, it is much easier to include hundreds or even thousands of visual effects shots in films. As a result, it is much easier to overuse visual effects, taking the focus away from the story.

Fig. 3.9 — Tom Hanks feigns ping pong motions with CG ping pong balls (*Forrest Gump*, 1994).
3.2 Comparison 2: Modern, Overt, Effects-Driven Blockbusters

*The Day After Tomorrow* and *Transformers* are two overt, effects-driven blockbuster films, completely different from the two previous analyses. Each film features hundreds of visual effects shots, with large-scale CGI and complex digital compositing. Though each presented significant innovation with its effects, neither film revolutionized the industry. Each was received with lukewarm reviews from critics concerning story, plot, and application of effects, but both were praised for the effects themselves. However, only one of these films’ effects stand the test of time.

*The Day After Tomorrow (2004)*

*The Day After Tomorrow* is a 2004 apocalyptic blockbuster science fiction film about environmental issues, particularly global warming. The film is best known for its depiction of several weather catastrophes, which ultimately destroy numerous major cities and leave the world in a new ice age. The film features hundreds of large-scale visual effects shots, most of which make no attempt to hide themselves. This film is a textbook example of an overt effects-driven film.

The film features most major methods of digital visual effects: large-scale CG environments, as well as heavy use of particle effects within those environments, CG creatures, and major CG enhancements to live action sequences. Though the film is very overt in the presentation of its effects, the style of the effects themselves is still
meant to be photorealistic. The filmmakers did not expect to fool anyone into thinking that the shots in the film had actually been achieved practically. Obviously, the filmmakers could not conjure a tidal wave to destroy New York, or pit several tornadoes against the urban sprawl of Los Angeles. Regardless, the visual effects were meant to appear as realistic and believable as possible, so as to match the live action plates, which typically served as the foreground and/or background elements.

The sheer scale of the effects sequences in this film virtually guarantees that some scenes will be effective in some ways, but ineffective in others. It is also not surprising that some scenes feel as if they exist only because of the ability to create impressive visual effects, which in turn will make impressive trailers, which, finally, will lure moviegoers into the theaters. Many scenes in the film can be reduced to either effective or not effective, but several are quite mixed.

One of the film’s first major effects sequences is the destruction of Los Angeles by a major thunderstorm that spawns several tornadoes. Wide shots of the city do an excellent job of selling the scale of destruction brought on by the storm. The shots make effective use of heavy-duty particle effects (dust, debris, clouds, and tornadoes) and the partially destroyed buildings look quite real. The digitally enhanced sky is also convincing. Though the scene is effective on the whole, some shots in the destruction of Los Angeles sequence betray the scene’s integrity. The tornadoes (also achieved through use of particle effects), for example, do not look enough like real tornadoes.
Viewers expect to notice the effects in an overt effects-driven film. Although the tornadoes are an impressive technical creation, the fact is that viewers will be able to tell too easily that they are not real (see figure 3.10). They will know from watching news and weather television what a real tornado looks like. This does not work in a film whose effects are supposed to be photorealistic. Particle effects technology had not yet caught up with the rest of the effects in the film; the tornadoes in *The Day After Tomorrow* would be more at home in the older 1996 film *Twister*.

The Los Angeles sequence also features what I have come to call a “trailer shot:” a shot that does not serve the story substance of a scene, but looks great in a trailer or on a DVD box. The trailer shot in this sequence is when the Hollywood sign is destroyed by a tornado that ravages the Hollywood Hills. Viewers familiar with tornadoes know that one would be incapable of climbing a hill. Science aside, that shot adds nothing to the story beyond providing a great image (see figure 3.11).
Soon after, a massive tidal surge overwhelms the already rain-flooded New York City. This sequence has effective and ineffective parts, but overall, works fairly well. The water flows realistically, and the surrounding destruction of buildings and cars adds to the sequence. Its strongest shot is of the wave approaching the New York Public Library. The shot is a seamless combination of live action and digital elements. The foreground of the library stairs was a live set with a massive bluescreen background. At the bottom of the stairs, the set was flooded with real water and cars, as well as people running from the coming surge. All of the practical elements work in concert with the surge, which was CG. Other CG elements included the background buildings, sky, cars, and people, as well as spray coming off the wave. This effects shot is the best in the film, because it includes photorealistic CGI working hand in hand with appropriate practical elements (see figure 3.12).
Other sequences in the film were not so successful. Midway through the film, several characters must venture out of their library haven to procure antibiotics from a ship, which has drifted into the flooded city and frozen in place in front of the library. Not long after the characters climb aboard the ship, on cue, four digitally-generated wolves approach the ship. The wolves look very unrealistic. Like the tornadoes, viewers know how wolves look and move. The 3D models are not particularly convincing, but the way the wolves interact with the environment gives away the fact that they are not real wolves. They cast dark shadows as if there were a strong overhead light, despite the fact that in earlier shots, the humans cast almost no shadows in the flatly lit snowy world (see figure 3.13).
The compositors added a shadow to help distract viewers from the fact that the wolves make no real footprints in the snow. Little clouds of kicked-up snow help minimally, but overall, this sloppy shot decries the heretofore-high quality effects work. Unfortunately, it is not just that shot which hurts this scene. The film ignores how the wolves manage to get on the ship (and how the ship managed to drift to a stop between skyscrapers in downtown New York City), regardless of the contrived coincidence of their appearing at that very moment. The scene moves inside the ship, wherein the wolves are shown very little. This is effective for two reasons: the tension is higher due to the viewer not knowing where the wolves are, and the unrealistic appearance cannot detract from the experience.

The second half of the sequence is even more ineffective. After the characters retrieve what they need from the ship, they realize that the “super-cold” air in the eye of the storm is descending over New York City. Shots of skyscrapers in the city show glass breaking from top to bottom. However, when they run inside the library, the cold
begins to “chase” them toward their library haven, as ice forms on the walls and floor just behind their feet. The CG ice that forms on the walls is very visually impressive, but is laughably unrealistic in concept. While the concept of the freezing air descending in the eye of the storm fits the canon of the story, the fact that it “chases” them into the building—and how they outrun it—is a contrived action setpiece.

This film is entertaining, despite the extravagant visual effects. Unfortunately, unwarranted effects shots betray the narrative structure of the film. A film does not need depth to be good; but this film could have been much tighter and simpler, and would have been better for it. Forgettable films often feature forgettable effects. Upon its release to theaters in 2004, Richard Roeper called the effects “first-rate” despite the film’s predictable plot, boring characters, and scientific inaccuracy (Roeper, 2004). His colleague, Roger Ebert, said the film’s effects made it worth seeing, describing several sequences in his review as an “unmissable” spectacle (Ebert, 2004). However, its effects do not stand the test of time well. The “wow-factor” has worn off, which has caused the problematic parts of the film’s effects to become more apparent. The particle effects driving the CG tornadoes have since been outdone, as have the fluid effects driving the tidal wave and flooding. The CG animals in The Day After Tomorrow do not stand up well to similar attempts in later films. The conclusion I draw from this film is that polish is more important than pushing the envelope of scale.
Transformers (2007)

*Transformers* is a 2007 blockbuster action film about two races of alien robots, which arrive on Earth in search of their life-giving “Allspark” cube. The film’s director, Michael Bay, directed several other effects-heavy action films in the 1990s and 2000s, including *Armageddon, Pearl Harbor*, and *The Island*. Each of the three preceding films featured varying amounts of visual effects work, but none of the three was on the same scale as *Transformers*, which is known for its huge, photorealistic robots, which transform seamlessly into common Earthly machines.

While *Transformers* has far fewer effects shots than *The Lord of the Rings: The Return of the King* (~550 versus 1500), the effects were complex due to the ground broken to create them. Visual Effects Supervisor Scott Farrar said “When we first started on this project, we researched similar types of characters in other movies, and we were surprised to discover that nobody had ever really done a film about giant, realistic-looking robots… the goal was to make our characters look photoreal” (Duncan, 2007). Like *The Day After Tomorrow*, *Transformers* employed innovative effects techniques, but did not revolutionize the industry the same way *Jurassic Park* did.

The two most complicated and impressive facets to the effects in *Transformers* are the detailed, gritty appearance of the robots and the complicated animations of their transformations. Due to its simplicity, reflective metal was one of the first realistic textures attempted in CGI for film. The look of the liquid metal T-1000
character from *Terminator 2: Judgment Day* was possible in 1991 because of the ability to create reflective surfaces in CGI interfaces, a new technology for the time. *Transformers'* robots, despite being comprised largely of flat metal surfaces, created an entirely different kind of challenge. Skin is commonly held as one of the most difficult materials to create with CGI, due to the way light scatters upon striking it. But realistic robots required far more than simple, reflective surfaces. Michael Bay was adamant about the realism of the Transformers. He rejected initial designs for the robots because they did not look like they had come from actual cars (Duncan, 2007). Scott Farrar and his team responded to this by adding thousands of recognizable car parts to the models. The artists also added detailed textures to the hard-body surfaces of the robots to make them look gritty and realistic. Visual Effects Supervisor Scott Farrar said they had to have thousands of pieces, as well as layers of swirled paint, scorched grease, and scratches (Duncan, 2007) (see figure 3.14).

![Fig. 3.14 — Intricately detailed textures on a CG robot (*Transformers*, 2007).]
The transformations are awe-inspiring. Rather than create 3D models that could actually bend and transform from one shape to another, the artists created different models for each shot of each transformation, based on the camera angles in the edit. This enabled the artists to focus on specific actions of the transformations, highlighting certain machine parts as they shift, shake, and move from position to position. The result is a much more detailed and believable set of transformations (see figure 3.15).
Fig. 3.15 — A complex, single-shot transformation (*Transformers*, 2007).
This attention to detail is perhaps the most important reason that the effects in *Transformers* stand the test of time. Like in *Jurassic Park* and *Forrest Gump*, no shot was left unpolished. The aforementioned complexity of the modeling/rendering and transformation were further aided by seamless cinematography and compositing.

Michael Bay shot the film both frenetically and freely on set, rather than base his shots around complicated visual effects setups. He made heavy use of handheld camera shots, as well as complicated camera moves on dollies, cranes, and steadicams, rather than using locked-down tripods for visual effects shots. He also used thorough amounts of dust, debris, and practical explosions to enhance the feeling of realism for both the actors and the viewers (Duncan, 2007) (see figure 3.16).

![Dust and smoke create complex composites (*Transformers*, 2007).](image1)

![Dust and smoke create complex composites (*Transformers*, 2007).](image2)

Fig. 3.16 — Dust and smoke create complex composites (*Transformers*, 2007).
Both of these techniques significantly increase the challenge to the compositors. When using motion-control cameras, the filmmakers can record a camera’s exact movements in a computer, which can then be inscribed into computer software and used to recreate camera moves for the CGI elements. Due to the frenetic pace, Bay chose not to use complicated motion-control cameras, which would have slowed down the shoot and limited his freedom in determining camera moves. This added considerable amounts of work in post-production, because each effects shot had to be matchmoved frame by frame. The matchmovers completed the task very successfully, and in doing so added an important layer of realism. The film’s cinematography is not reliant on, nor even affected by, the presence of extensive visual effects. Consequently, the effects call less attention to themselves. In a more invisible effects film, such as Forrest Gump, realistic, naturalistic cinematography is a very necessary component of the process. In an overt effects film, such as Transformers, this simply adds to the effects’ photorealism. That is why the effects in Transformers will better stand the test of time than those in The Day After Tomorrow.

3.3 Comparison 3: Epic, Effects-Driven Fantasy Films

The Lord of the Rings is a $270 million epic film trilogy based on the three-part novel of the same name by J.R.R. Tolkien. Its film adaptation was the brainchild of producer/director Peter Jackson and his writing and producing team of Fran Walsh and Philippa Boyens. The three films were released respectively in 2001, 2002, and
2003, and were met with widespread critical and popular praise. Each of the three films won the Academy Award for Visual Effects, employing visual effects on a scale not seen before nor since. *The Chronicles of Narnia: The Lion, The Witch, and the Wardrobe* is a 2005 film adaptation of the first book in the seven-part fantasy trilogy written by C.S. Lewis. While the film was a critical and commercial success, and its visual effects received an Academy Award nomination, the effects were considerably less successful than those in the *Lord of the Rings* trilogy. For this thesis, I will limit my writings about *The Lord of the Rings* primarily to the third film, *The Return of the King*, as it contains the most effects shots of the three films, and combines all of the techniques from the first two films.

*The Lord of the Rings: The Return of the King (2003)*

*The Lord of the Rings: The Return of the King* (hereafter *The Return of the King*) is a 2003 fantasy epic film, directed by Peter Jackson, based on the third of a three-part novel written by J.R.R. Tolkien. First published in the mid 1950s, Tolkien considered the books to be “unsuitable for dramatic or even semi-dramatic representation,” due to the length and detail of the story, as well as the bevy of creatures and fantastic locations (Carpenter, 2000). Though several notable filmmakers tried, a live-action *The Lord of the Rings* proved to be an unachievable goal until Peter Jackson began shooting the films back to back to back in 1998, after several years of preproduction (Rickitt, 2007). While I am primarily focused on *The Return of the
King, this section also refers to the first two films, *The Fellowship of the Ring* and *The Two Towers*.

The films contain the largest combination of effects ever achieved, using an extensive variety and combination of practical and digital techniques, resulting in a visual effects industry revolution, which still stands as the grandest achievement in the history of visual effects. While many effects-driven blockbuster films contain 200-300 effects shots, the first film in the *Lord of the Rings* trilogy, *The Fellowship of the Ring*, contained 540. *The Two Towers* featured 799. *The Return of the King* dwarfed both, featuring 1,488 visual effects shots (“The Passing of an Age,” 2004). Every imaginable effects technique makes several appearances in the trilogy. *The Return of the King* did the same on an even larger scale; the scale dwarfs every other film, especially considering the quality of the result. The film features large-scale CG environments, characters, and creatures, digital doubles, morphing, miniatures, extensive bluescreen filming on studio and exterior sets, particle effects, rigid body dynamics (a method for simulating the interaction and destruction of CG objects), and artificial intelligence-driven crowd simulation on a scale never before seen (up to 350,000 characters on-screen simultaneously). The film also features subtle invisible effects to tweak performances and locations. More impressive than the wide array of techniques is the way the effects were combined; hundreds of the films’ effects shots combine all of the aforementioned elements. I have chosen to focus on some important successful and unsuccessful elements from the film; though the former greatly
outnumbers the latter in the actual film, it is important to find out how small problems can slip through the cracks even in such a legendary visual effects masterpiece. The visual effects in these films could make a complete thesis by themselves.

The character Gollum (whose first extensive appearance was in *The Two Towers*) was, at the time, the most realistic and expressive CG character ever created. His realism stemmed from the quality of the animation (a combination of keyframe and motion capture animation, all driven by Andy Serkis’s on-set performance), as well as the sophisticated process of developing his look. Joe Letteri, talking about the character’s creation, said, “When I took on Gollum I knew that creating a believable 3-D animated performance was no longer a major issue and that the key to believability was going to come down to realistic skin” (Rickitt, 2007). A longstanding problem with creating CG humans is that skin (and other organic materials) contains water, through which light easily passes. When light passes through the layers of skin, some of it is absorbed and refracted before exiting, which gives it a different appearance (Rickitt, 2007). The CG department at The Passing of an Age employed a newly developed technology called “subsurface scattering,” which simulates the way light scatters when it reflects off skin. The result, at the time, was the most lifelike skin ever put on film (see figure 3.17).
Gollum appears in several scenes with the lead actors, in daylight and nighttime, performing humanistic actions. Peter Jackson and Director of Photography Andrew Lesnie filmed the sequence with Andy Serkis as if Gollum were just another human character. Serkis wore a tight-fitting white bodysuit on-set, to constrain his hair and clothing from accidentally obscuring the other characters; since Gollum is smaller than Serkis, the filmmakers had to minimize his impedance on the actors and the set. In post-production, digital artists painted Serkis out of the plates and replaced him with the CG Gollum, filling in gaps with clean plates filmed on-set. Having Serkis acting on-set not only helped the other actors’ performances, but added a wealth of small interactions between Serkis and the environment, which carried over to the final composite with Gollum. When Serkis moved, he kicked up dust and water, moved rocks and clothing, and drove the actors’ sightlines. These subtle interactions completed the dazzling shots of Gollum (The Lord of the Rings: The Two Towers, 2002).

Fig. 3.17 — Gollum with subsurface scattering (The Lord of the Rings: The Two Towers, 2002).
The collection of locations in *The Return of the King* features caves, fields, mountains, and a plethora of buildings. While many full-scale sets were designed and built, and the crew filmed in several beautiful New Zealand locations, visual effects played a large role in the creation of the final shots. *The Return of the King* features several scenes at Minas Tirith, which is a unique city built into the side of a mountain.

Wide shots of Minas Tirith feature a stupendous 25-foot miniature model (see figure 3.18), which had over a thousand intricately detailed buildings (Rickitt, 2007). The model was so large that its creators began calling it (and other large models for the production) “bigatures” (“From Vision to Reality,” videorecording, 2002). Wide shots were often populated extensively with CG characters, and compositors added smoke and fire elements where required to enhance the realism. The model was placed into an astonishing digitally matte painted CG environment. Scenes taking place in Minas Tirith cut between the “bigature” and full-scale mockups of various regions of the city. Artists painstakingly added countless layers of detail to this gigantic set,
which cut seamlessly with the similarly intricate model. Some shots on the full-scale set featured views across the Pelennor Fields to the city of Osgiliath; these shots were accomplished through use of bluescreen, which was replaced with the digital matte painting during compositing.

The Pelennor Fields CG environment is one of the most extensive and open-ended CG environments ever created. It is a combination of a 3D environment and a 360-degree panoramic matte painting. Originally devised as an extensive matte painting, the film’s conceptual artists chose to expand it into a large-scale 3D environment, which gave freedom to the director and director of photography to shoot any angles they wanted for the sequences on the fields. The main benefit of this freedom is that the viewer never feels lost in the environment; there are clear and consistent cues that signify where the action is taking place (see figure 3.19).

![Image](image.png)

Fig. 3.19 — Live actors compositied into a digital environment (The Lord of the Rings: The Return of the King, 2003).

The editing and cinematography also add to the sense of direction. The overall level of detail in the 3D model itself was relatively low. To make it photorealistic in
appearance, the conceptual artists stitched together dozens of photographs from all over New Zealand, which served as textures for the environment, making it incredibly photorealistic. The CG environment serves as a background for shots of the Minas Tirith model, and it became a full-scale environment for the epic battle between men and Sauron’s invading army, which is the crowning achievement in this superlative visual effects film. It combines all of the aforementioned effects on a staggering level.

The battle of Pelennor Fields scene has more effects shots than a typical summer blockbuster film (“The Passing of an Age,” videorecording, 2004). Several shots in the sequence contained significant visual effects innovations, but most of the sequence’s impact comes both from the sheer scale and quantity of the effects, and the near perfection of the vast majority of the shots. The sequence contains over 350,000 CG characters driven by artificial intelligence, created with software called Massive, developed for the trilogy during The Fellowship of the Ring. Massive imports a 3D model and creates “agents” in large quantities, which interact with each other based on a set of parameters applied by the artist. An artist can program agents to perform actions based on their circumstances. For example, if an artist creates two groups of agents, the groups can be programmed to rush and fight each other, employing preset animations to simulate fighting and dying (see figure 3.20). Massive can turn any 3D model and animation into an agent. The battle of Pelennor Fields sequence employs Massive-generated humans, orcs, horses, and the undead (“The Passing of an Age,” 2004).
These swarms of digital creatures serve as a supplement to traditionally animated CG creatures and live action elements filmed against bluescreen. The CG creatures include “mûmakil,” creatures that resemble giant elephants. The mûmakil, animated in such a way to give them the illusion of significant weight, benefit from the same subsurface scattering employed on Gollum (see figure 3.21). The sequence cuts between the fields and the city, in which humans battle orcs and trolls en masse. The hundreds of thousands of digital fighters appear in the background of the city shots. The combination of these elements, set in the expansive CG environment, solidifies this film as the paragon of visual effects.
However, not every visual effects shot in this film is perfect. The mistakes are mostly of a technical nature; there are no trailer shots or effects for effects’ sake. The story never takes a back seat to the effects, despite being entirely dependent on them. Some of the problems are in the battle of Pelennor Fields sequence. At one point, the agile elf Legolas jumps onto a stampeding mûmakil, climbs to the top, kills several bad guys, shoots three arrows into the creature’s brain, then rides down its trunk and jumps off as it falls and dies. The action sequence is a bit ridiculous, even more so than a similar feat he performed on a cave troll in The Fellowship of the Ring. Peter Jackson stated that he wanted to outdo that scene from Fellowship, as well as Legolas’ catching and mounting a moving horse in The Two Towers (“The Passing of an Age,” videorecording, 2004). Peter Jackson is famous for his over-the-top direction choices all over The Lord of the Rings, especially in action sequences. The majority of these decisions work flawlessly, but this one does not work as well as many others. There are matting issues that call attention to the fact that actor Orlando Bloom was
shot against bluescreen, as well as occasional instances where it is obvious that a
digital double was used instead of a real actor.

Another problem in the film is the CG fire, used during lighting of the beacons
sequence and in the battle of Pelennor Fields. Realistic CG fire is one of the hardest
particle effects to achieve, and while this film is not a bad example, it is not an
exemplary one either. The lighting of the beacons sequence involves the lighting of
several signal pyres atop mountains. The beacon fires look like 2D fire elements,
despite being well tracked onto the pyres. This is apparent when the camera revolves
slightly around the scene; the fire does not rotate realistically. Later, the Grond
battering ram (at the Pelennor Fields battle) looks unrealistic due to the fire being
slightly different colors in different shots. In some shots, the fire is obviously digitally
generated, and in others, it looks as if it was filmed practically then composited onto
the live action plate. Either one would have been an acceptable method used alone, but
the combination does not work. There are minor matchmoving issues from time to
time. For instance, when Frodo runs into Mt. Doom to destroy the One Ring, he
appears to slide across the bare rock. This is because the camera move on the
miniature background plate did not match exactly with the bluescreen foreground
plate. These are small issues in an otherwise brilliant effects film.

The story relied heavily on visual effects to bring a grand fantasy world to life.
Despite the gargantuan scale of the effects, the emphasis is always on character and
story development, which the effects only serve to illustrate. As a result, the film never
feels like an effects showoff, even if it does feature the best visual effects ever created. The effects are of a uniformly high quality across the entire trilogy, and is one of very few large-scale effects-driven films in which nothing significant should have been done differently. These effects will not only stand the test of time; they will stand among other landmark effects, such as the 1933 King Kong, the original Star Wars films, and Jurassic Park, forever.

**The Chronicles of Narnia: the Lion, the Witch, and the Wardrobe (2005)**

The Chronicles of Narnia: the Lion, the Witch, and the Wardrobe (hereafter Narnia) is a 2005 fantasy adventure film, produced by Disney and Walden Media, based on the C.S. Lewis novel of the same name. The film and novel tell the story of four English children who find a pathway to a magical fantasy world in a wardrobe. Andrew Adamson, visual effects supervisor for Batman Forever and Batman & Robin, and director of Shrek and Shrek 2, directed the film. Narnia is an overt, effects-driven blockbuster film. Some of the effects are photorealistic in style; others are cartoony. Different sequences have broadly different styles. This disconnect exposes the primary fault with this film’s effects: the many styles do not match.

As I stated previously, Narnia did receive an Academy Award nomination for its visual effects. There are several effective sequences in the film, and the scale of the effects is very large, covering many different types of effects. The film features many CG creatures and animals, as well as extensive digital matte paintings, miniatures, and greenscreen work. The film’s three primary vendors, Sony Pictures Imageworks,
Rhythm & Hues Studios, and Industrial Light & Magic, are all accomplished visual effects companies, each with Visual Effects Academy Award-winning films under their belts. Each company produced excellent shots for this film; had any one of the companies been the primary vendor, executing the majority of the effects shots, chances are that the film would not suffer the same problems with cohesion. However, employing several companies enables the creation of more shots, more quickly.

Andrew Adamson stated that cost was the main issue with the visual effects, especially when it came to the creation of dozens of different types of CG creatures (Duncan, 2006). Adamson supported the inclusion of all of the creatures from the book. He stated, “Although, intellectually, the studio was in support of that idea, when it came down to the actual cost of creating all those creatures, there was a little chipping away of my original list—but we still wound up with many varieties.” Furthermore, Disney and Walden Media chose to divide the creatures between different companies, rather than assign creatures to one company, and other effects to alternate companies.

The film’s opening is the first effects sequence: a nighttime air raid over London. While not a particularly memorable sequence, it is relatively convincing. Due to the overt nature of the effects in this film, viewers are immediately aware of the fact that they are seeing visual effects. More importantly, the film establishes a relatively photorealistic, believable style of visual effects. Subsequent scenes feature the same style, even more effectively: the matte paintings in the human world are very believable, as are subtle set extensions and crowd enhancements to the train station.
Upon their arrival to the old man’s home, Lucy quickly finds the path into Narnia through the wardrobe. While there, she meets Mr. Tumnus, a faun. A faun is a mythical creature with the general appearance of a man, but with a goat’s horns, ears, legs, and tail. The horns, ears, and tail were all achieved with special effects makeup. The legs, on the other hand, were CG. Rhythm & Hues modeled and rendered goat legs, which were tracked to green stockings on the actor’s legs (Duncan, 2006). The result is a convincing blend of makeup and CG effects. This combination sets the photorealistic style. However, after the rest of the main characters make the journey through the wardrobe into Narnia, the style changes.

The first evidence of the conflicting styles is when the main characters meet Mr. and Mrs. Beaver, two Anglophone beavers. The beavers, created by Sony Pictures Imageworks, alternate between humanistic, cartoony, and beaver-like behavior and motion, a significant disconnect from the previous, more photorealistic effects. According to Jody Duncan (2006), Andrew Adamson wanted their appearance and behavior to be very naturalistic. Though their appearance is moderately realistic, their facial and body animation is often exaggerated like that of a character from an animated children’s film. At other times, they wave their arms about expressively in a very humanoid fashion. This does not fit the previously established style of visual effects. A counter argument is that the style works for a fantasy world in a film aimed at children; also, since their performances are driven by human voices, the humanoid motion could be seen as fitting their characters (see figure 3.22).
This would be a more valid argument if all of the visual effects in the Narnia portions of the film fit this style. Some elements in Narnia are cartoony, while others, such as the hero character Aslan, are photorealistic. By himself, Aslan is a beautiful piece of computer-generated imagery. As per the director’s instructions, every aspect of his appearance is realistic: his fur and the way it reacts to light, his eyes, the way his muscles interact with his skin, and his animation all mimic that of a real lion very believably (see figure 3.23). Bill Westenhofer, visual effects supervisor at Rhythm & Hues, said that like the beavers, “Andrew wanted Aslan to be authentic in terms of anatomy and behavior. We’ve worked on a lot of animal films where we created what was supposed to be a real cat, for example—and then it gets up and dances, which screws up the whole illusion” (Duncan, 2006) (see figure 3.24).
Nevertheless, two problems plague Aslan: first, the fact that his style does not match with the more exaggerated performances of the beavers, which were purposefully anthropomorphic, and second, the fact that his appearance is so lifelike, that when he speaks, his calm, human voice becomes uncanny. It sounds unnatural to have an unaltered human voice come from a large, photorealistic lion.

Fig. 3.23 — Aslan’s photorealistic face and mane (The Chronicles of Narnia: the Lion, the Witch, and the Wardrobe, 2005).

Fig. 3.24 — Aslan’s motion and appearance are almost identical to that of a real lion (The Chronicles of Narnia: the Lion, the Witch, and the Wardrobe, 2005).
As the film progresses, other problems emerge. While the matte painted backgrounds are very beautiful, the lighting on the characters (shot on greenscreen) often does not match properly. Normally, when shooting scenes against green or bluescreen, the filmmakers shoot background plates prior to filming the studio greenscreen material. However, in this case, the schedule mandated that some of the greenscreen shoots had to occur before location shoots, so the director of photography simply lit them as neutrally as possible, so they would work with any type of background plate (Duncan, 2006). While neutral lighting is the only solution to such a scheduling problem, the intricacies of real-world light depend heavily on environmental features, and the neutral studio lighting did not match well with the background plates. The effect can distract viewers from the scene, as it becomes obvious that they are watching visual effects (see figure 3.25).

Fig. 3.25 — Unnatural lighting makes these characters stand out from the matte-painted background. (The Chronicles of Narnia: the Lion, the Witch, and the Wardrobe, 2005).

There are other problems related to greenscreen. During almost all shots involving characters on moving objects, such as Edmund and the Ice Queen on her
sleigh, or Lucy and Susan on Aslan’s back, not only is the lighting poor, but the live action elements and actors appear as if they are static, despite their being on a fast-moving object. Their hair does not blow in the wind; their faces are perfectly calm, and they often speak freely with little wind noise. The stillness betrays the fast-moving background, and again calls attention to the effects (see figure 3.26).

Fig. 3.26 — Despite the rapidly passing background elements, these characters’ hair barely ruffles in the wind, a clear indicator that they were filmed against greenscreen. Notice the motion-blurred flowers passing in the foreground (The Chronicles of Narnia: the Lion, the Witch, and the Wardrobe, 2005).

Other technical elements hurt the film, as well. Several action scenes feature overly dramatic camera moves on miniature and CG elements that could not exist if they were filmed as full-scale shots. Not only are they unrealistic, they do not fit the style of the film’s cinematography. The most ineffective example of this, and the worst effects shot in the film, is a shot of the White Witch leaving her palace in a sleigh. In the shot, the camera moves rapidly down the face of an icy cliff, rotating and panning up at the end to follow the sleigh as it exits a cave and speeds onto a frozen lake. The CG environment is sparsely decorated and poorly textured, and the CG sleigh and
reindeer have little interaction with the snowy ground, leading to a very unconvincing shot.

Despite several impressive individual effects sequences, the pieces altogether fail to make a cohesive whole. There is a very clear line between the effects of each of the main vendors. While some of this is the result of the director’s conflicting direction, some of the problems stem from disagreements during preproduction, about how the shots were to be divided between companies. Initially, Disney and Walden Media intended to award the entire project to one company; however, given the scope of the project, they instead decided to split the majority of the work between Sony Pictures Imageworks and Rhythm & Hues (Duncan, 2006).

When Disney and Walden Media awarded the project to the two companies, the production required approximately 800 visual effects shots. Rhythm & Hues and Imageworks each signed a contract to be paid a certain fee for their work on the film, based on their respective shot counts. However, the number of effects shots quickly surpassed 800, eventually reaching more than 1,400 (Duncan, 2006). The producers hired Industrial Light & Magic and nine other visual effects studios to create varying amounts of shots for the film, which did not fully solve the problem. Eric Farrar, previously of Rhythm & Hues, stated that Disney and Walden Media asked Imageworks and Rhythm & Hues to create additional shots beyond their original contract, for no additional money, to complete the film (personal communication, April 27, 2009). Imageworks is part of the large Sony Pictures Entertainment, Inc.,
and possessed both the staff and the funds to create additional shots for the film for free. Rhythm & Hues, however, is a much smaller company, with a significantly smaller staff and budget. The additional shots would have required additional time and staff, which in turn would have cost money that the small studio could not afford to spend; as a result, the studio refused to create additional shots for free. Disney and Walden Media responded to this refusal by taking shots away from Rhythm & Hues, awarding the majority of them to Imageworks (E. Farrar, personal communication, April 27, 2009).

This action had two effects. Firstly, it hurt Rhythm & Hues’ budget because they had already hired additional contracted staff to work on the film, and because Rhythm & Hues could not pick up any other significant projects because the bidding season for large projects (mostly summer blockbusters) had already passed. Secondly, it created animosity between the two companies over the redistribution of shots from one to the other, which hurt the effects’ overall quality. Visual effects studios typically guard their trade secrets for achieving certain types of effects, but when collaborating with another company on a film, allow an appropriate amount of license to achieve a cohesive style between sequences. For this film specifically, many elements went from studio to studio; in some cases, multiple studios worked on the same shots and sequences. However, after losing a significant portion of their bid for the film to Imageworks, any chances of Rhythm & Hues sharing their Academy Award-winning techniques for creating photorealistic CG animals diminished significantly. Farrar
stated, “It’s not like the studios were sharing technology… ‘this is how we’re making our cheetah look so real; maybe you guys should do that with your wolf or your fox.’ None of that stuff happened. It was very much a competitive, secret thing… And I think the debacle, with shots being taken away from our studio and given to another sort of furthered that animosity.” (personal communication, April 27, 2009).

Rhythm & Hues, originally contracted to deliver over 500 shots for the film (E. Farrar, personal communication, April 27, 2009), delivered only 380 shots (Duncan, 2006). Their work (the character Aslan, the character Tumnus’ legs, the final battle, and other miscellaneous CG characters)(Duncan, 2006) is by far the most stylistically consistent and believable in the film. Imageworks, which had far less experience in photorealistic animal CGI, delivered most of the work criticized in this thesis, including the majority of the greenscreen material, the CG environments, and the beavers. Regardless of the lower quality of Imageworks’ shots, it is the disconnect in

Fig. 3.26 — The shots from this battle sequence are among the film’s most effective (The Chronicles of Narnia: the Lion, the Witch, and the Wardrobe, 2005).
styles between the companies that hurts the overall quality of the visual effects in this film. Disney and Walden Media were largely responsible for this disconnect, as they were not willing to put forth the money to facilitate the needs of what was originally their principal effects vendor on the film.

Viewed in comparison to the quality and financial success of The Lord of the Rings, the entire production of Narnia appears to have been driven by the prospect of profit more than the prospect of bringing life to a treasured piece of children’s literature. Given the success of The Lord of the Rings, the producers knew it was a virtual guarantee that Narnia would be similarly successful, and indeed it was. As a result, Disney and Walden Media, who began their pursuit of the rights in the middle of The Lord of the Rings saga in 2002, chose to make sacrifices in the visual effects department to save money. These sacrifices ultimately resulted in visual effects that do not stand the test of time, and, unfortunately, hurt the quality of the film and reduce the impact of its classic story.

3.4 Comparison 4: Character Dramas With Invisible Effects

Brokeback Mountain and The Bucket List are two critically successful drama films which, despite being quite popular (and one quite controversial), neither film ruffled the feathers of the visual effects world, due to the small scale of the effects applied and the invisible nature of the effects. However, only Brokeback Mountain’s
effects were truly invisible, as The Bucket List contained shots poorly executed to a degree that made them quite noticeable.

**Brokeback Mountain (2005)**

*Brokeback Mountain* is a romantic character drama about two cowboys who meet and fall in love while working as ranch hands in the Wyoming mountains in 1963. This film is known for its controversial but universally critically acclaimed plot. Most viewers have no idea that the film even utilizes visual effects, which consist of compositing tricks and simple CG enhancements, partly to enhance the natural beauty of the filming locations, and partly to reduce the difficulties of working with animals.

The film contains 75 visual effects shots, mostly consisting of sky replacements, set extensions, and erasures. *Brokeback* also features approximately 10 shots that feature CG sheep, which were the film’s most complicated effects. Many of the effects shots have simple background enhancements to augment the location photography. For example, in one shot early in the film, artists at Buzz Image added additional height to a background mountain range (see figure 3.27).
Other additions include the painting out of unwanted parts of the scenery, such as a lake and a stone wall. Sky replacement was another common type of shot in the film: replacing an empty blue sky with a dramatic sunset and adding extra clouds, lightning, and hail to a stormy scene (“From Heartbreak to Triumph on Brokeback Mountain,” 2006) (see figure 3.28). Each of the enhancements passes unnoticed to most, merely adding to the lush imagery filmed by cinematographer Rodrigo Prieto. The effects never once call attention to themselves. They never detract from the story; they merely serve to draw viewers further into the story.

Fig. 3.27 — This shot features a partially matte-painted background to enhance the height of the mountain (Brokeback Mountain, 2005).
The film’s most complicated effects shots are similar to the aforementioned background enhancement shots, but with the addition of swarms of GG sheep. The production team had access to approximately 700 real sheep, but needed thousands more for certain shots. Buzz Image created simple, effective CG sheep which, with proper rendering and color grading, fit into the scene and look exactly like the real sheep populating the background (see figure 3.29). Like the background enhancement shots, they never call attention to themselves. The artists took steps to keep their digital sheep from clustering in recognizable patterns. They created custom software scripts that added randomness to their grouping, making them appear much more natural. Several shots in the film combine the background nature enhancements and the sheep. These relatively complex shots are seamless and add to already beautiful cinematography.
Fig. 3.29 — Each of these three shots features hundreds of both real and CG sheep, which are indistinguishable from each other (Brokeback Mountain, 2005).
A professionally trained eye can point out the compositied shots, but the effects in *Brokeback Mountain* are such that most viewers will never even notice them. Visual Effects Supervisor Louis Morin characterized the project as such: “If we've done our job correctly, no one will know what we've done” (“From Heartbreak to Triumph on *Brokeback Mountain,*” 2006). The visual effects will surely stand the test of time if audiences cannot tell they are there.

**The Bucket List (2007)**

*The Bucket List* is a 2007 character-driven dramatic comedy about two men who go on a trip around the world, completing a list of things to do before they die from their illnesses. Like *Brokeback Mountain*, the film is non-effects-driven, using subtle enhancements such as background replacement and augmentation, face replacement, and full greenscreen compositing. However, effects were applied for different reasons than in *Brokeback Mountain*. Whereas *Brokeback Mountain* sought to augment and enhance natural beauty, *The Bucket List* used visual effects to make the characters appear in locations in which the production could not legally or practically (or cheaply) film, as well as to achieve shots where it would have been both dangerous and impractical to film. These shots were created with varying degrees of success, from simple and subtle background replacements, to obvious and false-looking greenscreen shots.

The most effective shots in this film are not necessarily the simplest. During their trip, the two main characters go skydiving, yelling at one another on the way
down. Obviously, it was neither practical nor safe to film a scene while falling from a plane, so the producers used visual effects to create the scene. Other films have attempted skydiving visual effects shots, with varying techniques and varying levels of success. For example, in the film *Shoot ‘Em Up*, the filmmakers shot the lead actors, fully costumed, against a greenscreen, then placed them in a CG environment. Given the amount of action that happens during the fall, this approach served the film well.

However, for *The Bucket List*, the characters take a more textbook fall from the plane, so director Rob Reiner filmed an actual skydive with stunt performers, then Ring of Fire Studios digitally replaced only the heads of the stuntpersons by filming the actors fully clad in green, on a greenscreen stage. They recreated the camera moves from the fall in-studio, then took the actors’ heads and composited them over the stunt skydivers. While this a reasonably noticeable effect, it was the most viable photorealistic option, mostly because it limits the greenscreen to the actors’ heads, rather than their whole bodies, thus reducing the effect’s overtness (see figure 3.30).
Several visual effects in this film pass relatively unnoticed. Rather than travel all over the world to film The Bucket List, the production team filmed several scenes on greenscreen, replacing the background in post-production with widely varied locations the world over. For a restaurant scene in Italy, they filmed on a stage with green only covering the windows; these shots stand out only to a discerning eye. At one point, the characters drive muscle cars around a racetrack. While the filmmakers did film at a racetrack for certain shots, all shots of the actors were filmed on greenscreen. Wider shots of the racetrack look quite realistic, but closeup shots in the cars expose matting issues around the characters’ hair. Similar problems plague several of the greenscreen scenes, including the characters’ walk around the Taj Mahal (see figure 3.31). Like before, wider shots succeed more than close-ups. The only
sequence with no major problems is a safari montage, where the characters ride around the African savanna in an off-road vehicle. The sequence consists primarily of stock footage, with the actors not present. Shots of the actors were filmed outdoors against greenscreen, with natural light. The natural light sells the scene, because it is very difficult to recreate in a studio setting. Along with the skydiving, the savanna sequence is the most effective in the film.

Fig. 3.31 — These shots were filmed against greenscreen, with a stock footage matte painting serving as the background (The Bucket List, 2007).
One scene in the film stands out from the rest: the characters travel to Egypt and have a conversation atop the Great Pyramid. Obviously, setting up a film crew on top of a pyramid was impossible; using visual effects was inevitable. Unfortunately, the effects in this sequence fail for two reasons: firstly, the greenscreen left terrible matting issues around the characters’ bodies, and secondly, the lighting is obviously from a studio. What stands out in particular is the fact that the highlights from the studio lighting are at times brighter than the background, which appears to have been stitched together from photographs. Any photographer would know that a sunset sky is extremely bright, and had the characters been exposed the way they are in the film, the sky would have been completely overexposed and mostly featureless. The compositors chose to insert a beautiful sunset matte painting, which did not match the studio material. To the compositors’ defense, the studio lighting ruined any chance of a completely believable shot. Nevertheless, the compositors could have done more to make the photo background more believable (see figure 3.32).

Fig. 3.32 — The highlights on the characters are brighter than the sunset sky behind them, a clear indicator of the presence of effects (The Bucket List, 2007).
While it makes sense for this film to feature visual effects, the visual effects did not always help the story, if only because they were distractingly noticeable at times. In a character drama such as this, the visual effects should be kept completely to the background. While it was undoubtedly the filmmakers’ intentions to have invisible effects, they did not succeed. This seems to reflect an attitude that the quality of visual effects does not matter in a non-effects-driven film. However, films like *Brokeback Mountain* illustrate how invisible effects can subtly yet significantly enhance scenes, even if no one ever notices them. The visual effects’ success depends almost entirely on their invisibility.

3.5 Comparison 5: Medium-Scale Modern Effects Films, Overt Versus Invisible

*Children of Men* and *War of the Worlds* make successful use of visual effects on a large scale, though neither is as grand as *The Lord of the Rings*, in terms of the number of shots and techniques used. The purpose of this comparison is to illustrate the difference between the two films’ very different styles, despite their similar scale. These two films, respectively, are similar to *Forrest Gump* and *Jurassic Park* in their use of visual effects.
*Children of Men* (2006)

*Children of Men* is a 2006 near-future dystopian science fiction film, co-written and directed by Alfonso Cuarón. Set in 2027, the film tells the story of a future in which all women have become infertile. Most of the world’s governments have collapsed or changed radically due to the chaos. This film features almost entirely subtle, invisible visual effects. To help create a gritty, realistic atmosphere, director Alfonso Cuarón based the cinematography around long, uninterrupted takes. Most of these long takes were achieved with the digital stitching of multiple takes shot sometimes days or weeks apart. The film also features extensive ‘futurizing’ of its London setting, with the addition of dozens of motion graphics advertisements on buildings and cars. Other effects used include extensive digital matte paintings, and a CG baby shown being born and carried around.

From the very beginning, there are dozens of screens (TV screens, advertisement signs, computer screens), most of which are entirely digitally generated. These screens look very realistic, and are tracked in to the scenes perfectly. The matchmoving is paramount; all the handheld camera shots would give away any bad matchmoving. Any poorly matchmoved elements would not have moved in sync with the background plates. This first scene also employs the aforementioned digital stitching. The shot of the main character leaving a coffee shop and walking away was shot in one day, and the shot of the explosion (with his reaction) was shot on a different day. In the first half of the take, Theo (the main character) walks out of the
crowded coffee shop, then proceeds to walk down the street. Behind him, the café suddenly explodes, which was filmed practically. Obviously, the café had to be clear for the explosion, so the seamless digital transition (without a cut) to a new take enabled a safe environment for the effect without interrupting the continuity of the shot. The result is a very realistic and jarring explosion, which is vital to establish the chaotic nature of the film’s setting early in the movie (see figure 3.33).

The future London setting was filled with advanced technology, but it appeared very worn and gritty, due to the chaos that unfolded when the fertility crisis hit. This was an effective marriage of effects and art direction. Double Negative Visual Effects Supervisor Frazer Churchill said, “We spent a lot of time trying to imagine how advertising technology might have advanced; it was not 30 years’ advancement. It was 15 years’ advancement and 15 years’ neglect” (Fordham, 2007). Several of the
digitally generated and composited screens are dirty and feature broken panels and rough edges. This adds much to the effects’ photorealism, a vital component in an invisible effects film (see figure 3.34).

![Image](image.jpg)

Fig. 3.34 — All the signs and advertisements on the buildings are CGI (*Children of Men*, 2006).

The film also features very effective matte paintings and background extensions, yet another invisible effects technique. The matte paintings of factories in the distance seen while traveling to Bexhill are very realistic (see figure 3.35). In addition to their photorealistic appearance, they are well tracked into the scene. A wide shot of the coastal city near the end of the film is another effective matte painting.
Two of the film’s most complicated and impressive invisible effects scenes feature the digital stitching of several shots as well as an innovative car camera rig, all created with the sole intention of hiding the use of visual effects. In the first sequence, the camera follows Theo as he gets in a car, which is subsequently chased by a group of attackers, until finally Theo (followed by the camera) seamlessly exits the car, and the car drives off. The sequence features six shots from three separate locations. However, the long sequence in the car designed to appear as a single take did not exactly match the cinematographic style of the rest of the film. The scene was shot with a motion control rig built in to the roof of the car, which moved around the car, showing all five performers. Though it was effective for showing all parts of the car in a single take, its motion was noticeably smoother than the rest of the film’s jerky handheld camerawork. The transitions in and out of the car, accomplished via mask wipes between different shots, were very effective. A mask wipe is where the film cuts...
between two similar shots via an undetectable animated line. Though the scene appeared to be one long take, it was actually shot in multiple locations across multiple takes. The effects were executed perfectly, but the problem was with the non-matching style, not the execution of the effects.

Even more impressive is Theo’s almost 9-minute walk through an active warzone. Most viewers will never know that it was a complicated visual effects sequence featuring several seamless digital transitions (Fordham, 2007), as well as digital building extensions, matte paintings, and digital enhancements (blood, smoke, explosions) to the scene’s extensive practical effects. The digital transitions are so seamless that even a viewer well-versed in visual effects could not know the exact number of shots stitched together in the sequence (see figure 3.36). The impact of these scenes, the latter in particular, is considerable, and greatly enhances the mood and the story. Cuarón could have filmed these scenes more traditionally, using cuts to transition from location to location. However, his real-time documentary style creates a feeling of realism and naturalism. According to Churchill, “Alfonso wanted to catch what he called ‘moments of truthfulness’ … which made every frame say something about the protagonists in their world” (Fordham, 2007).
Unfortunately, one visual effects sequence in the film was not as successful as the others. While the cinematography of the scene in which Kee gives birth to a (CG) baby fits the documentary style of the film, the baby itself was not as realistic or
believable as the other CG elements in the film. The filmmakers intended to create an entirely photorealistic CG baby, but as of 2009, most agree that a truly photorealistic human has not yet been achieved. The complexities of creating a lifelike CG human that is truly indistinguishable from a human counterpart are mind-boggling, due to the subtle interactions of our anatomy with the world.

CGI that comes close, but does not truly reach this level of absolute realism is uncanny and sometimes disturbing to most viewers because as animations become very nearly lifelike, it creates a natural response of revulsion. The same is not true of less lifelike animations, which do not approach this level of realism. The baby in *Children of Men*, meant to be absolutely photoreal, is in this “uncanny valley” (“When fantasy is just too close for comfort,” 2007). To be fair, the artists at Framestore CFC in London, who created the CG baby, did a phenomenal job of making the baby as photoreal as possible. At times, it is virtually indistinguishable in appearance from a real baby. However, one of the baby’s strong suits was also a major problem: the keyframe animation. The baby’s keyframe-animated movements were incredibly similar to that of a real baby. It flailed its arms, and rocked back and forth just as a real baby human does. The result, however, is that viewers’ attention is drawn to the baby, and under scrutiny, some viewers will notice that the baby does not look completely real. This on-again off-again realism is what triggers the revulsion as outlined in the theory of the uncanny valley (see figures 3.37 and 3.38).
The biggest problem with the baby sequence is that it is the only instance of unnecessary visual effects in *Children of Men*. On one hand, the CG baby does enable impressive and documentary-like cinematography in uninterrupted takes, as opposed to the clever editing that would be necessary to conceal a prosthetic baby. But why not use a real, human baby? Most likely, they chose to use CGI because of the strict work restrictions for young actors. A common proverb in the world of filmmaking is to never work with children or animals. The proverb contains good advice, but in this case, the film would have been better served by using a real baby in at least some shots. For certain shots, the CG baby enabled specific actions, important to the story. For example, immediately after Theo delivers the baby, he holds it in his arms, and it appears to be lifeless. Then, suddenly, it springs to life, crying and flailing its arms. In a movie about the human race’s desperation to find newborn life, this moment, where the human race hangs in the balance, is very emotionally intense (see figure 3.38).
All in all, *Children of Men* was a breath of fresh air in the visual effects world. The film made extensive use of visual effects, yet few people know they drive some of the film’s crucial sequences. Some reviewers confidently state that the film features few or no effects. “No effects, no greenscreen, no 3D virtual camera or set - instead a highly elaborate physical construction to allow for an otherwise physically impossible shot,” states one review (Jones, 2007). The matte paintings and digitally stitched shots are completely invisible to the untrained eye, and enable a unique style of cinematography for this genre of film. Clearly, the handheld camerawork provided massive challenges to the visual effects team. But it is important to note that the filmmaking style was not sacrificed to make the effects easier to accomplish. Story was the priority. The effects illustrate the story; the story was not altered to show off the effects. Churchill summed up his experience with *Children of Men* by saying, “I
consider it a privilege to have worked on such a film, where visual effects were so well integrated into the story. Alfonso understood the possibilities of what he could achieve with visual effects. They were simply there to enable his vision” (Fordham, 2007).

**War of the Worlds (2005)**

*War of the Worlds* is a 2005 science fiction action film directed by Steven Spielberg, starring Tom Cruise. The film tells the story of a family trying to survive as alien-operated machines rise from the ground and begin attacking and destroying several cities. The film features visual effects extensively, but with only 239 effects shots, it is not entirely driven by them. Like *Children of Men*, *War of the Worlds* has very few weaknesses in its photorealistic effects. Unlike *Children of Men*, the effects in this film are mostly overt in nature, which is not surprising in a film about an alien invasion.

The film’s first action sequence, where tripod machines rise from the ground and begin destroying people and buildings, is the film’s strongest effects sequence. The cinematography is mostly from a human perspective, which helps sell the utter scale of the digitally-generated machines and the objects they destroy (see figure 3.39). There are no weak shots in this entire sequence. The shots use a mix of CGI and practical effects, including pyrotechnics and miniatures. Senior Visual Effects Supervisor Dennis Muren took a minimalist approach to the effects shots. Instead of using all-CG or all-miniature shots, Muren filmed miniatures only for specific actions,
such as a church splitting in half or a group of houses being crushed. He then relied on compositors to blend the actions with plates of the actual locations. This approach had the least possible impact on the shots envisioned by Spielberg and Director of Photography Janusz Kaminski. Though the effects team built a complete miniature church, the only part of the miniature shot used was the specific area of the split.

Muren stated that “there’s no clue that it’s going to be an effects shot until the effect begins, because it’s all natural” (Fordham, 2005). Realistic, natural cinematography is a key element of photorealistic visual effects. The artists applied CGI in a similarly limited fashion, using it only where necessary. Another benefit of this technique is that with fewer shots, artists have more time to polish the effects and make them convincing.

Fig. 3.39 — Thorough compositing helps sell the scale of the machine and its distance from the camera (War of the Worlds, 2005).
Other parts of the sequence are even more impressive. The tripod fires a heat ray toward the people, destroying anything it touches. One particularly horrifying effect is that humans are reduced to mere dust. The on-set effects team (with the makeup department) blasted practical dust onto the actors, which was combined with additional digital dust in the composite. The ray also blasts buildings into rubble. Again using a combination of CGI and practical elements, the visual effects team created dozens of completely photorealistic shots of utter destruction.

The most effective part of this latter half of the sequence is a single shot of a bridge being destroyed by the heat ray. The visual effects artists painted most of the location bridge out of the frame, replacing it with many CG elements, including the bridge, several cars, and of course, a lot of dust and debris. The fast-paced cinematography continues as the main character runs through the streets and finds his family, at which point they steal a van and head out of town. The mayhem continues around them with absolute realism (see figure 3.40).
Fig. 3.40 — This sequence combines extensive practical and digital effects, all in the context of the film’s normal cinematography (War of the Worlds, 2005).
The first action sequence transitions into a dialogue scene in a van on the freeway, in which the camera moves seamlessly in and out of the van. The interior was shot on a bluescreen stage, enabling the camera to move freely. Spielberg shot exteriors of the van to match the camera moves from the bluescreen set, as well as a 360-degree panorama of the van’s path, to serve as the background for portions inside the van. This invisible effect is very subtle, never calling attention to itself. It is more successful than the similar sequence in *Children of Men*, because the shots do not break the previously established style of cinematography.

The other visual effects sequences in the film are not quite as spectacular as the first, but are entirely successful in their presentation. The main character and his family make it to a ferry crossing in New York, where they try to cross so they can continue their trek to Massachusetts. However, three tripods appear on the hill overlooking the river, forcing the ferry to set off hastily. As it crosses, yet another tripod, hiding under the water, rises and attacks the boat. The main characters swim to safety, and watch as the tripods destroy the boat and the town. The attention to detail adds significantly to this scene; the glow of the lights on and around the CG tripods is especially effective. The water tripod looks realistically wet; the CG water integrates well with the miniature ship.

The film’s second most effective visual effects sequence occurs in Boston, with the main characters very near their destination. The army has discovered that tripods are ceasing to function, which means human weapons can be used to destroy the alien
machines. The most effective shot in this sequence is of a small group of humans firing a rocket launcher at the teetering tripod, which subsequently falls through a brick warehouse and stops moving. This shot is straightforward in concept: live-action foreground plate with humans against bluescreen, miniature warehouse rigged to explode against bluescreen, CG rocket, CG tripod, clean background plate. The composite makes for a perfect shot. The rocket fires and hits the tripod, which falls forward dramatically, making the warehouse explode and collapse. The choice to use a miniature warehouse helped sell the shot; the way it explodes and collapses is a very difficult effect to recreate with CGI.

This, like *Children of Men* and *Jurassic Park*, is one of very few films in which nothing should have been done differently, effects-wise. Its effects illustrate the story, without calling too much attention to themselves, despite their overt nature. The naturalistic, human-focused cinematography and minimal use of effects within that context serves as an excellent framework for effects that will stand the test of time, though they will stand with little fanfare.
Chapter 4: The Rules of Good and Bad

The analyses in the previous chapter (partially) illustrate the incredible variety of digital visual effects in cinema since the Digital Revolution. There are some common elements therein that tend to appear in films whose effects stand the test of time. There are two overarching criteria: keeping the focus on the story (not the effects) and keeping consistent, solid attention to detail across the entire production of the effects. Obviously, poorly created visual effects will not stand the test of time. One needs only to look at the laughably unrealistic composites in the low-budget campy film Shark Attack 3: Megalodon to know that visual effects that do not succeed initially stand no chance of remaining effective. However, many films’ effects become outdated very quickly, even if they were well received initially. An example of this is The Day After Tomorrow—initially impressive, but not a classic effects film. Using my analyses, we can surmise a basic set of criteria for creating effects that stand the test of time. The criteria relate to technical, artistic, and practical issues in the visual effects process.

4.1 Visual Integration: Matchmoving and Compositing

Matchmovers and compositors are responsible for integrating visual effects elements with practical elements. They play the pivotal role in integrating the effects, although, clearly, they are not the only artists responsible for the integration with plate
photography. Bad matchmoving or compositing instantly draws the viewer’s attention to the visual effects in a bad way, distracting him or her from the story. Good matchmoving and compositing can help conceal weaker elements in the effects by making them less noticeable.

Matchmovers are responsible for tracking CG elements into live-action background plates. On set, every move the camera makes affects the spatial relationship between objects in the frame. When shots require the compositing of CG elements, the matchmovers must carefully motion track the shot to make sure the elements move in sync with the rest of the scene. In the early days of visual effects, matchmoving was not a possibility, and composited shots had to be locked down on tripod so the filmmakers could carefully line up matte paintings, glass paintings, miniatures, creatures, and any other elements, creating the illusion of one seamless shot after the elements were composited. However, with the advent of CGI and its virtual camera system, filmmakers were able to film effects shots with the same camera movements as the rest of the film, which served to make visual effects less noticeable and less distracting, and therefore more effective (Rickitt, 2007).

3D animation software packages feature a virtual camera, which can be matched to a live action camera move. To accomplish the matching, artists often use specialized matchmoving software, which analyzes various points in the shot and calculates how the points move in parallax with one another. The matchmovers must make sure that every time the camera pans, tilts, dollies, rotates, raises, or lowers, the
movement is recreated exactly in the matchmoving software. Matchmovers must also match the real camera’s focal length and aperture, because they affect the parallax motion and depth of field, respectively. Shaky handheld shots, which feature random, unpredictable motion, are the most difficult to matchmove (like those in Children of Men). After all calculations have been made, the specialized matchmoving software exports data back to the animation software, which applies the data to its virtual camera, completing the matchmove. The matchmoved shots are rendered and sent to compositors for integration into the scene.

An alternative method of matchmoving is using a motion control camera system. A motion control camera system automatically records camera motion data, which can be imported into 3D animation software. Motion control is also useful to filming separate elements on a live set, when filming them together would be impractical or dangerous (for example, filming someone running across a highway can be accomplished by filming one pass of the actor and no cars, and a separate pass of cars). The motion control system ensures that the separate elements are coordinated. The data from the motion control system can also be scaled. This is useful for shots requiring the compositing of live action and miniature elements.

Modern films feature few locked-down tripod shots. Moreover, effects-driven films tend to be on the heavy side when it comes to moving camera shots. Bad matchmoving manifests itself plainly: the improperly tracked elements appear to “slide” across the background because their motion does not exactly match that of the
live camera. Bad matchmoving is a dead giveaway that a shot features visual effects, breaking any chance at the shot’s believability. An example I used earlier was in *The Lord of the Rings: the Return of the King*. During the climax, Frodo’s feet appear to slide across the rock, as he runs in to destroy the One Ring. The bad matchmove runs the risk of pulling the audience out of the moment at a pivotal scene. Fortunately, the shot is so short that most viewers will not notice upon their initial viewing.

The importance of matchmoving is paramount. When it is successful, it is one of the best ways of making effects more invisible. The film *Children of Men* features almost exclusively handheld cinematography. While this made for incredibly complicated matchmoving, the result is stunning: the effects integrate with the shaky camera work so well that viewers never question whether they are CGI or not.

Another vitally important component, for many of the same reasons, is compositing, the final step in the visual effects process (not including digital color grading, which is often completed by a different department). During compositing, all elements join to create a seamless, finished shot, ready to be inserted into the final film. Compositing is important because it can make or break almost any shot. Although good compositing largely relies on the quality of the components, in certain situations, compositing can fix problems that arose in other parts of production (Wright, 2008).

The capabilities of compositing are extensive. Compositors (along with rotoscope artists, who are often junior compositors) can paint out unwanted objects
from the frame: film equipment or crewmembers, scratches or dust on the film, reflections, or elements that violate copyright. The compositing team can also change brightness and color elements to make spring look like fall, summer look like winter, or exchange night for day. The control over existing production footage is part of what makes compositing so important and powerful. The primary purpose of compositing, of course, is to combine several layers of effects together with the original production footage. This can be as simple as replacing a bluescreen-covered window with a matte painting, or as complicated as combining hundreds of layers of CGI render passes, dozens of bluescreen elements, motion control miniature shots, and a wide variety of other things (Wright, 2008). *War of the Worlds* and *Transformers* feature outstanding compositing. Each film is set in a dusty, gritty environment. Compositing CGI *behind* practical dust and debris is a painstakingly complex process. The result, however, is just like complex matchmoving: it hides the effects, because it keeps the CGI from jumping off the screen and calling attention to itself.

When compositing dozens or hundreds of elements, it is very important for the compositors to ensure the elements match each other in a number of ways. Aside from the aforementioned matchmoving, elements must match in color balance, contrast, and film quality (including the presence of grain). Small differences in any of these areas call immediate attention to the fact that the viewer is not watching a single, unaltered piece of film footage. The shots of Tom Hanks interacting with historical figures in *Forrest Gump* is a terrific example of film quality matching.
Children of Men’s effects are so successful because of the quality of the matchmoving and compositing. The CGI in the film is not as advanced or extensive as in many other films. However, with excellent matchmoving (paired with naturalistic handheld photography) and effective compositing, most viewers will never notice the effects in the film. The same is true of the effects in Brokeback Mountain, although matchmoving was less of an issue than compositing. Matchmoving and compositing are vitally important, because it does not matter how good the other elements are if they are poorly matchmoved or composited.

4.2 Naturalistic and Consistent Cinematography

As CGI became more prevalent in films in the late 1990s and early 2000s, films began to include full-CG shots. Although the first fully-CG film, Toy Story, was released in 1995, live action films did not feature full-CG shots until several years later due to the inability to create sufficiently photorealistic effects to match live action footage. Eventually, though, that level was reached and filmmakers could for the first time put literally anything they imagined onscreen (Rickitt, 2007). With that freedom came the ability to move the virtual camera in inhuman fashion. One of the advantages to full-CG shots is that the camera is not limited by physical camera rigs; the shots are not limited by dollies, cranes, or even helicopters. While this adds diversity to the types of possible shots, it also tempted filmmakers to create wild virtual camera moves that do not match the cinematography of their films. For example, in The Chronicles of
Narnia: the Lion, the Witch, and the Wardrobe, the film’s live action sequences are filmed quite traditionally: dollies, pans, tilts, and the occasional crane shot. However, some of the film’s full-CG shots depart drastically from this style. One shot is particularly unrealistic: the camera dollies under a speeding sleigh as it rushes across a frozen lake. The filmmakers most likely chose to do this because it was visually impressive and easy to do in the digital realm. It has a negative effect on the film’s overall quality, though, especially concerning the effects, because it draws attention to the effects. Viewers know that a camera cannot pass under a sleigh, and since the film does not consistently use this style, it just looks unrealistic.

Had the film previously established more stylized cinematography, this effect would not have been distracting. There are many dramatic camera moves in The Lord of the Rings that do not distract the viewer, because the film features several of them very early in the narrative, setting a consistent style. I, Robot (2004) features even more stylized cinematography, with dramatically unrealistic camera moves several times through the film. This style, while unrealistic, is consistent and fits within the story’s visual canon.

For a film’s effects to truly stand the test of time, the cinematography must be consistent. I also believe that the more naturalistic the cinematography, the better the effects will last. There is an important difference between the unrealistic shots in The Lord of the Rings and I, Robot. With few exceptions, The Lord of the Rings’ unnatural cinematography is at least based on natural cinematography. For example, in The
*Fellowship of the Ring*, the camera swoops dramatically around the tower at Isengard, as if from a helicopter, revealing the character Saruman casting a spell from the top. The camera moves very smoothly and gets very close to Saruman’s face, which would be virtually impossible to do in a practical environment. The camera’s movement is based on how a real production team would have filmed the shot with a helicopter, but with environmental imperfections (wind and mechanical vibration, the need to stay farther away) taken out of the equation. The result is a slightly unnatural, but not jarring, shot. *I, Robot* features far more unrealistic shots. The camera regularly flies around the characters unnaturally, switching instantaneously between full speed and slow motion. They are not grounded in reality, instead providing a distinct and memorable style for the film.

### 4.3 Limited Scale and Avoiding Unnecessary Shots

Another byproduct of modern computing power and increased numbers of effects studios and artists is the ability to create hundreds or even thousands of digital effects shots for a film. Earlier Digital Revolution effects films, such as *Terminator 2, Jurassic Park,* and *Forrest Gump,* each had dozens of visual effects shots, a large number for the time. As techniques have developed, those numbers grew from dozens to hundreds to thousands. Unfortunately, this also enabled filmmakers to create too many shots, betraying the quality of the film’s editing. The creation of effects for effects’ sake is greatly detrimental to a film’s overall effects quality. Trailer shots are
another byproduct of this overreliance on visual effects, such as the infamous shot
portraying the destruction of the Hollywood sign in *The Day After Tomorrow*.

Impressive visual effects draw audiences to theaters. As a result, producers and
directors are tempted to include unnecessary effects shots and sequences, attempting
to increase the “cool” factor of their films (and increase the film’s profits), while
sacrificing some of the narrative quality. While this thesis is not about the narrative
quality of films, it is, however, important to point out that in order for effects to stand
the test of time, all effects must be central to the story.
Chapter 5: Conclusion

Many factors affect viewers’ perspective of the visual effects in any given film, including some that I did not discuss in this thesis. There are no absolute rules that, if followed, will lead to classic visual effects that stand the test of time. Furthermore, each major visual effects landmark only occurs once; films that follow major landmarks are bound to live in their predecessors’ shadows. For example, audiences were inevitably going to compare The Chronicles of Narnia to The Lord of the Rings given their similar genre and source material. That does not change the fact that the visual effects in Narnia were distinctly inferior to those in Rings, but it exaggerated the difference.

The overarching truth in visual effects is that story trumps all. The purpose of visual effects is to illustrate a story in a way that could not be done otherwise. Creating effects for effects’ sake is directly detrimental to a film’s overall success. Extraneous effects hurt films’ pacing, make them too long, and often detract from the rest of the film’s visual style. They can also distract viewers from the plot and characters. For example, The Day After Tomorrow is a film with far too many effects sequences. All action scenes were completely effects-driven; viewers could easily predict when the next action setpiece was going to occur. As a result, the film is very long, and at times, very slowly paced. That is not to say that every film with dozens of effects sequences is slow; it is just that many films use effects to drive the story, rather
than letting the story drive the effects (as in *Children of Men, Jurassic Park, Transformers, The Lord of the Rings, or Brokeback Mountain*).

Another important factor is the overall level of polish and attention to detail on the effects shots. While some successful effects films, such as *The Lord of the Rings*, have thousands of excellent effects shots, the most successful overall effects films are often those that have a more limited scope in their application of effects. Films like *Transformers* and *Children of Men* feature hundreds of shots, rather than thousands, but every shot is impeccably polished. *Brokeback Mountain* features even fewer (75), and they are so polished that most viewers will never notice any of them. Filmmakers are tempted to push the limits of scale in visual effects, because many leaps forward in the past have come with significant increases in scale. Films from the Digital Revolution increased the scale of CGI by including dozens of shots. But with the huge rise in capacity for effects houses to create shots, the number of effects shots has risen so greatly that it sometimes noticeably affects the length and pacing of the films. Fortunately, many films do not suffer from pacing issues caused by unnecessary effects. All of the “good” effects films mentioned previously in this chapter get by without pacing issues, and there are many more films like those not analyzed in this thesis. Overall, there are so many effects films produced now that “good” and “bad” effects films exist in abundance, and continue to roll out almost constantly.

As time passes and new effects techniques are created, old (but still relevant) digital effects techniques have the opportunity to become better and better. Increasing
numbers of non-effects filmmakers are utilizing basic digital effects to enhance their films visually, as well as simplify the production. The CG sheep in *Brokeback Mountain* add visually to each scene in which they appear, and saved the filmmakers the frustration of working with copious live animals. Furthermore, films like *War of the Worlds* and *The Lord of the Rings* affirm that both digital and practical effects have a place (on a large scale) in modern filmmaking; they complement each other well.

Talking about the overtness of visual effects, Ray Harryhausen said that, overall, “The purpose of any film [is] to tell a story and transport a viewer into a world of make believe” (Rickitt, 2007). Using effects to drive the story (rather than plot and character) takes away from the story because viewers’ attention is misplaced. Used properly, however, visual effects, whether noticeable or not, removes virtually all limits from filmmakers’ creativity. Harryhausen also said, “Today’s ‘blockbusters’ suggest a demand for more ‘realistic’ images, but I sometimes wonder if this concept really makes entertainment more enjoyable. In the world of fantasy, I worry there is a danger of bringing the amazing image down to the mundane” (Rickitt, 2007). There is a line between the amazing and the mundane, and that mirrors the line between those films whose effects stand the test of time and those whose do not. Fortunately, the use of both practical and digital effects fits perfectly into the timeless canon established in 1933 by the original *King Kong*: the combination of a strong story, excellent characters, and a wide but complementary variety of effects techniques is a sure path to visual effects that stand the test of time.
List of Works Cited


