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The Art of Illusion

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I n t r o d u c t i o n

It is the intent of this thesis to show how the Industrial Light & magic (ILM) company ethos, which has provided them with a framework for success, has progressed from it's conception in 1977 through to today, and theorise on their probable future advancements.

Since the foundation of ILM, it has dominated the field of film, television and television advertisement effects. The question for directors today is not if ILM can produce on the screen what they want but can the prospective client afford to avail of their services? A major contributing factor to ILM's unmitigated success is the structure and planning of each project. This is discussed in chapter one and approached in chronological order.

This thesis will analyses the stepping stones in film effects history that ILM have created and left as markers for the rest of the industry to follow and imitate. This will achieved by an analytical criticism of the projects ILM have worked on and the directors of this work, such as Steven Spielberg, George Lucas and James Cameron. It will also give examples of others attempts to reproduce ILM's standard and criticise.

Finally this thesis will predict the future of ILM and the effects industry. The past has seen all kinds of attempts to make the cinema experience more realistic. A main determinant of special effects are the scripts of science fiction movies. This thesis will investigate the trend to use cyborgs, as a underlying or main topic, in recent science fiction film scripts. With the arrival of computer graphics and virtual reality, the art of creating the illusion has become a battle ground of advancements in technological break through's (ie. computer software and hardware), led by ILM.

Chapter 1

I L M'S S U C C E S S

ILM are the biggest, most prestigious, effects dominant company in the world. Discussed in this chapter are the factors to which this success can be attributed. They are storyboarding, planning, editing, visual style, co-ordination, personnel and software advancements.

Storyboards are numbered pieces of card with drawings, in chronological order, of the desired images to appear on the final film. They allow those planning the film to obtain a visual reference for the general flow and structure of the project. When planning a film ILM always allow a large amount of time for the storyboarding of the project. ILM plan every shot in every minute detail. By allowing themselves the space to create and make a multitude of changes, they inevitably produce the best storyboarding possible.

This is the point at which the effects are planned. Effects should always give consideration to the pacing of the movie. Pacing is how a movie runs in the viewer's mind. When writing a script the screenwriter must create adequate developments within scenes to construct overall momentum. This is vital as it subconsciously guides the viewer through moments of tranquillity, acceleration, action and back to normality. All of these areas have to fit together naturally. Whether a film's pace picks up or slows down, it must bear in mind the overall finished product. Special Effects are magnificent tools for creating and emphasising pace within instances, scenes or acts. No matter how spectacular or subtle the effects, it has to be part of the story. Pacing is another attribute which the ILM team have mastered. Each scene is assessed for its pace and importance in relation to the storyline and the other scenes directly before and after it. Directors like Spielberg and Lucas start by making the storyline interesting. With the use of storyboards and planning they increase the audience's

interest factor. Planning is essential in order to take a story to it's fullest potential, by the process of idea development.

In the words of George Lucas, "editing is film-making" (Lucas, quotation, Davis, 1988, p. 9.) Special effects sequences, are just like other sequences in a movie. They have to be edited correctly so as to convey the desired plot information, character emphasis, character development, pacing, drama and suspense. Editing is the key factor used to let movies narrate their tale correctly and effectively. These scenes have to be edited into the film so that they become part of the story and not a separate issue. Effects must belong to the film, whether they are designed to be spectacular or not. Clever effects are as much due to good editing techniques as technological advancements. Editing is the technique which enables an effect to become credible. The asteroid sequence in *The Empire Strikes Back (1982)* is made up of less than two minutes of effects, but these were edited so that they spread out over a total of 20 minutes throughout the finished product.

ILM also have, as one of their standard attributes, a "visual design style" (Davis, 1988, p. 9.), unlike any of their competitors. For ILM design is vital. It makes every image interesting to the eye. This applies to film making as a whole and not just to effects. The visual with the verbal provides the greatest entertainment/storytelling tool imaginable.

ILM create visual audience interest by use of their visual style. If we take, for example, an average science fiction spectacle of a space ship flying from outerspace to the under side of a planet, the normal way of approaching this, by a standard effects company, is to glide the ship to the under side of the planet (fig. 1). This is done by photographing the spacecraft, in Go-motion, against a blue background (fig. 1.1) and then matting the shot spacecraft onto a painting of the planet and star lit outerspace (fig. 1.2) by the use of Rotoscoping. The ILM approach is to first give the spaceship a planet approach path. This will be done by making the spacecraft appear to swirl in the centre of the screen (fig. 2.1). The second difference lies in ILM's approach to the design of the background, which would be separated into two different entities. The

Normal Approach

Fig.1 Normal Approach

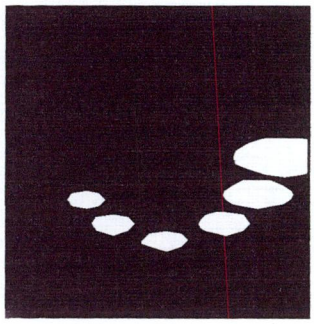

Fig. 1.1 Spacecraft

Fig.1.2 Background

ILM Approach

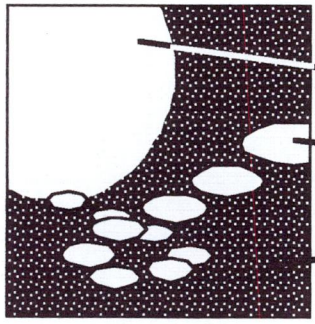

Fig. 2. ILM Approach

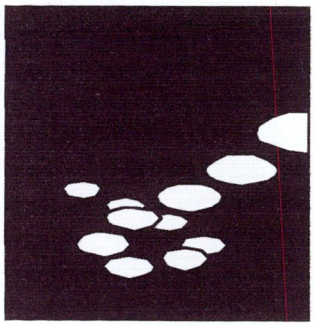

Fig.2.1 Spacecraft

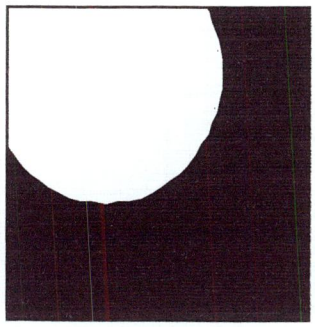

Fig. 2.2 Rotating Planet

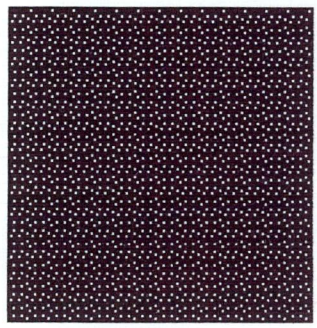

Fig. 2.3 Background

planet would be filmed rotating, in Go-motion, against a blue background (fig. 2.2). The final section would be the star lit outerspace painted background (fig. 2.3). The three sections would be put one on top of the other by the use of Rotoscoping to produce the finished composition (fig. 2). ILM also have a tendency to make the action faster, the segment shorter, adding pace and spending less running time to portray a simple message. When the two finished pieces are viewed together the ILM contribution, by use of it's visual style, holds the audiences attention better by creating a more visually interesting shot then their competitors.

ILM invest enormous amounts of money in equipment. All the computer technology (predominantly the silicon graphics computer), effects cameras and modelling tools on the market are basically in the same item price range. Also where another effects company may have only the capital to invest in some of these devices, ILM buy them all.

Figure 3 Silicon Graphics Computer Operator

In the domain of silicon computer software ILM is ahead of the rest of the industry (fig. 3). This, however is only a short term advantage, as they merchandise new software in package form soon after it has been created. This makes economic sense for the ILM's board of directors, and also adds a note of fair competition to the industry. For example, in 1986 ILM invented a new software package called Morph (or verb : Morphing). It was merchandised to whole television and advertising

world, but it was not until *Willow (1988)* did ILM actually used the package themselves.

ILM's major advantage has always been it's people power. They constantly invest heavily in employing the best people in the effects business.

> If ten artists are given the same pencils and told to draw something, the best ones are going to produce the best work, add to that, that ILM have all the pencils at their disposal where as a smaller company may only be able to afford a few.
> (Davis, 1988, p.9.)

For the film *T2*, ILM needed more people and more machines. To make sure they got the best people they ran advertisements, contacted people working in the industry and held interviews around the world. Their chosen few came from as far a field as Norway, New Zealand and Japan. The picked personnel were evaluated for their ability to work within a team framework. This means that ILM do not want people working for them who tend to work better alone. Therefore, emphasis for ILM is on team work. "There is no room for a loner in ILM, no matter how brilliant they are." (Davis, 1990, p.11.)

Combine all these factors together and you have the biggest, most professional, most dominant company in the field of special effects. Due to the fact that the film industry, determines the success of a film on the takings at the box office, an Oscar or Academy Award, ILM are the foremost at generating special effects. With the credit for six of history's top-ten money makers, a few Oscars (Academy Awards), ILM has popularised itself so well, in pop-film-culture that it has become a dominant influence on modern film making. Therefore the relatively low budget, and previously standard effects, of such features as *Star Trek (1967-69)* were dauntingly overshadowed by the release of *Star Wars (1977)*. Originally ILM set the precedent aesthetic agenda. Today ILM project's visual style is more subdued. ILM's personnel, size and ILM created software are the main areas in which ILM are ahead of its competitors.

Chapter 2

I N T E R P R E T A T I O N

ILM owes much of it's success in the interpretation of old film scenes and storylines, to the directors and staff they have worked with. In western culture interpretation is usually frowned upon because the ideas generated are not new but simply altered. Interpretation by it's normal definition, incorporates the fearful act of rehashing but ILM have embraced the idea with open arms and employ it successfully to achieve their visual, planning, editing and plot objectives.

The most prominent example of the advantages of interpretation is Japanese business. Just as the Japanese industrial community built the foundation of their designs, and consequent business prosperity, on the interpretation of American and European approaches, so ILM can attribute a part of their growth and special effects mastery. It is well known that Great Britain has a long history of excellent effects skill. Lucas and Spielberg photographed many effects and film footage in G.B. because they were guaranteed experienced staff and low studio costs.

ILM's attitude to interpretation is simple. If it worked before for someone else, ILM can fine tune it, update it, and make it worked for them. After all, what's the point in inventing a new anecdote or choreographing a innovative fight scene when there are aged ones that worked perfectly before. There is a common belief among the general public to believe that the old science fiction/horror movies, because of the sheer fact that they are old, consist of bad effects. However, many are better planned and executed than the modern attempts.

Ray Harryhausen produced amazing effects with *King Kong (1933)*. By using one small model Gorilla combined with a model full size hand and excellent editing, Harryhausen created the monster with the big heart, that menaced New York and fell in love with Fay Wray (fig. 4). Harryhausen also produced the immortal *Jason and the Argonauts (1963)*, a timeless piece of effects history that was only surpassed with the arrival of *Star Wars* .

Figure 4 King Kong (1933) by Ray Harryhausen.

The H.G. Wells story, *War of the Worlds (1953)*, was retold by George Pal who took great liberties in converting and creating the film of the same name (fig. 5). The previously state of the art effects seem now, out dated and tame, with a low credibility fact. But back in 1953 the film stunned the public world wide and won an Oscar for the advances it had made in the field.

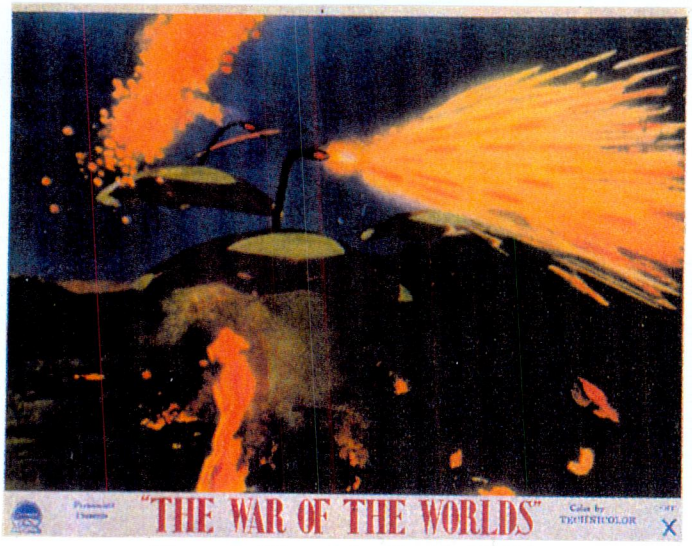

Figure 5 War of the Worlds (1953) .

The Forbidden Planet (1956), created by Disney, produced the visual effect of the almost invisible creature (fig. 6). It was created by the use of rotoscoping. This involved blowing up film frames and combining them with animation cels. The surviving character of the film was Robby the Robot who appeared in the television series *Lost in Space.* The film, although dated in style and prop. design, still has the capacity to frighten fans.

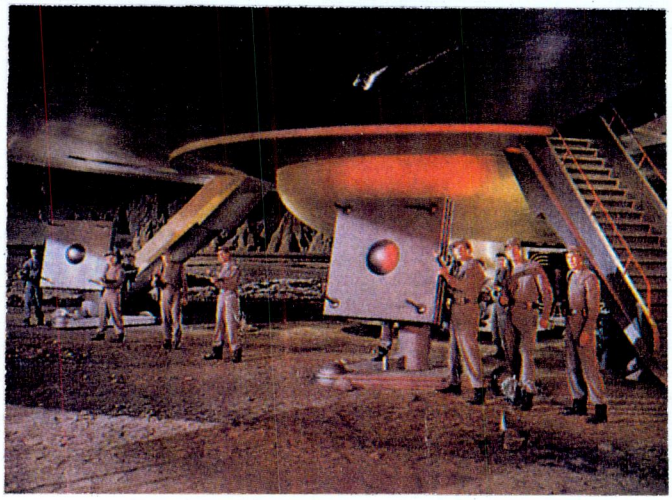

Figure 6 Forbidden Planet (1956) by Disney.

Audiences were guided into the world of make-believe, and held there by the realism, by people like George Melies, Ray Harryhausen, George Pal and Disney. The unfortunate thing for these films is that just as special effects grow in sophistication so do viewers expectations of visual effects standards, but only when viewed with hindsight. This leads the public to believe that old movies are worthless. On the contrary, they are minefields of precision planning, masterful editing, adrenaline pumping pacing and brilliant but dated effects. For the directors, it is a matter of looking closely at them and finding the great set-up scenes that can be interpreted and modernised.

Interpretation also has the added advantage of being tried and tested, where as with something new, the mood that it will create or the way it will come across in the finished motion picture, is unknown and therefore a risky venture. This is particularly for ILM, who tend to be involved in big budget productions. The dangers for them are phenomenal both in financial and prestige terms. The first gamble

ILM took was with their first enterprise, *Star Wars* . Due to the amount of special effects needed, and the realism demanded for each effect by Lucas, it could have very easily back fired, especially with the maverick effects team he had assembled.

Lucas never claimed the script for *Star Wars* was totally original. The *New Gods* comic published by DC comics, written by Jack Kirby *(1971-73)*, was the origins of the Star Wars script, with the characters names changed. Orion, becomes Luke Skywalker, his evil adversary is Darkseid who translates in the form of Darth Vader, Obi-Wan is the Highfather, Source is the force, and several visual parallels, such as laserbeams, remain for ILM to interpret into visual vocabulary.

When designing the look and feel of the closing battle against the Death Star in *Star Wars* , George Lucas took as one of the main influences, *The Battle of Britain (1969)*. If one sees the aerial dogfights in this film one will notice that the style of the aerial footage, the types of explosions, the dialogue and even the sound effects to some degree have played a large influence on the dogfight that is the climax of *Star Wars*. Even the Star Destroyer is based on a modern battle ship.

Joe Johnston's (exILM Designer) design of the AT-AT (Imperial Walkers, fig. 7), for *The Empire Strikes Back*, was definitely an interpreted from the *New Gods* comic The Dragon Tanks and the feel of a tank sequences from hundreds old WWII movies. Here is a prime example of how Lucas takes ideas previously used. With ILM and new technology he develops and modernises them to create good storytelling. The dragon like Imperial Walker scene is not only an adequate motion study, but an impelling dramatic event. Also, impeccable editing played a large part in the success of this scene.

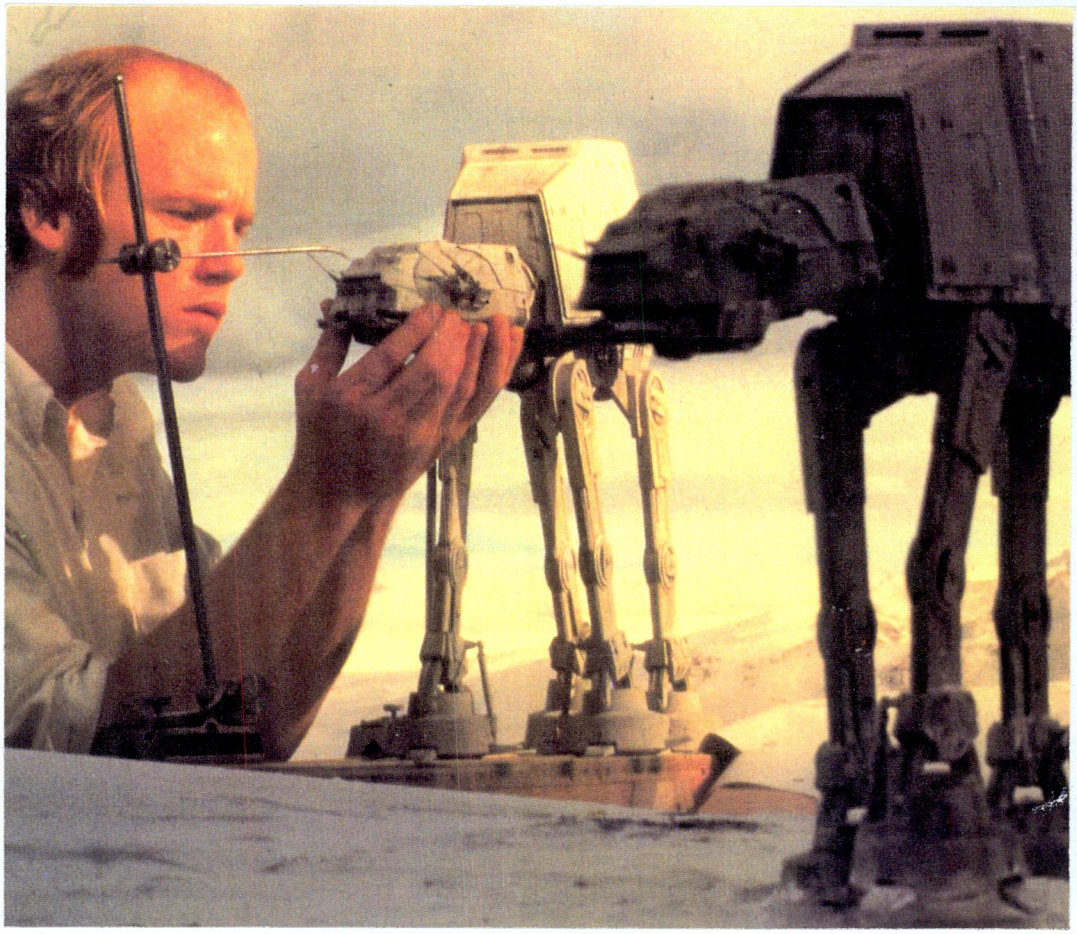

Figure 7 AT-AT Walker being animated by Phill Tippet for *The Empire Strikes Back (1982)*

The Sarlacc Pit sequence in *The Return of the Jedi (1984)* is a development or translation of the old Roman Coliseum legend. This scene has a great input from the old Flash Gordan serials. In one episode Flash is put into an arena to fight 3 deformed humans to the death for the amusement of Ming. The Rancor sequence in Jabba's palace, early on in the film, also has the same influences. The Sarlacc Pit sequence has the walk the plank idea, an obvious pirate stereotype scene, which is taken to new levels by ILM when Luke uses it as a diving board. New technology, now old technology (Go-motion puppetry for the Rancor, models, rotoscope, blue screen for the Sarlacc Pit) was applied, here again, to very traditional concept.

Ironically the Death Star battle in this film has it's origins in *Star Wars* . This is typical Lucas philosophy. Improving on others and

himself, where technology allows. For this film ILM's technology made available more multi-layered compositions and thus faster action. Their sole purpose was to show audiences, whom had become accustomed to the *Star Wars* Death Star, that they could still be dazzled. This is why *The Return of the Jedi* is very different from the first film, *Star Wars* .

Raiders of the Lost Ark (1981), only the third feature film of ILM's history, has hundreds of scenes, shots, lines of dialogue and characters that owe their origins to old movies and serials. Even Indiana himself has his roots in an old treasure hunting movie. The most evident interpretation is a direct tribute to the old western's, when Indiana is being dragged in the mud by a truck (fig. 8).

Lost Ark (1981), jumping from a horse onto a truck.

Indiana Jones and the Temple of Doom owes much of it's plot to a brilliant old adventure film, *Gunga Din (1939).* This film has been pillaged for it's fight sequences, which are fast and furious. Even the tongue in cheek humour lives on in the form of Lucas's Indiana Jones. *Gunga Din* is about a British soldier stumbling across a Kali-worshipping cult. Mola Ram as the brave knight to the rescue ideology, at the end of *The Temple of Doom,* has it direct origins from this story. Lucas's development of this has expanded the Temple idea into the focal point of his storyline and instil into it a chain reaction sequence of action scenes from it (the rescue of Willie; the freeing slave children; escaping in mine cars; mine car chase; cutting bridge in half; and many more) (fig. 9). It is the interpretation and design of these effects that make them special. One can see how development of an old idea leads to many new situations, all of which provide ILM with rich pickings for shots and effects to make special.

Figure 9 The Mine-Tunnel escape Indiana Jones and the Temple of Doom (1984)

For Cameron, when making effects for the *Abyss (1989)*, the computer animated probe scene was a danger he initially did not want to take, but thank to ILM, it paid off. Full of computerisation enthusiasm, because of the success of the Abyss, Cameron launched himself into *Terminator 2 : The Judgement Day (T2 ,1990)* , yet another ILM lead massive gamble. The risk taking history and policy of ILM is what makes them such an advancement orientated company. They never stand still, striving all the time, to create better effects, making superior stories more and more credible to the audience.

In assessing ILM's aesthetic style, arises the theory, that there are no truly original ideas, only amalgamation and regurgitations of the old, made with new slants, like computer graphics. This also leads to the conclusion that "...special visual effects defeat any theory of progress in creativity" (Solman, 1992, p. 32.). The technological advancements, primarily made by ILM, mean more artistic possibilities for film directors and therefore progress. Now it is possible to conclude the advancements made by ILM are only progressive, and not innovative, interpretations.

Chapter 3

A S S E S S M E N T O F

I LM E F F E C T S

The Star Wars Trilogy

Taking a look at *Star Wars* today, the effects seem critically flawed. When a small ship slips into the hull of the mother ship, the white-on-white matting is a sophisticated achievement. Yet in order to create the illusion of the star field beyond the cockpit of the Millennium Falcon, the pilots abnormal skin-tones look artificial, while the reverse angle shot of them is quite natural. This problem with front projection that only becomes apparent when the film is viewed on a television screen. Motion pictures are shot on film with 12,000,000 pixels per frame, where as American and European Television Broadcast with 150,000 and 210,000 pixels, respectively. Front Projection can give rise to colour discrepancies which are naturally highlighted in television. This is caused by poor picture resolution and the colour resolution of the individual television. The rod and wire removal technique works excellently in places. The elimination of undesired objects, however, is lifeless (for instance removal of the original wheels on Luke's hover craft).

The use of holographic projections in the chess game and Princess Leia's SOS are projected as 3D images (fig. 10), but one might expect that, having conquered the difficulty of such, not so advanced technology, scientist could also have eradicated the problems of flickers and image impurities. Lucas would argue that the Millennium Falcon and R2-D2 were time and war battered machines, but this still would not constitute the extent of annoying scan-lines and imperfections used in these scenes.

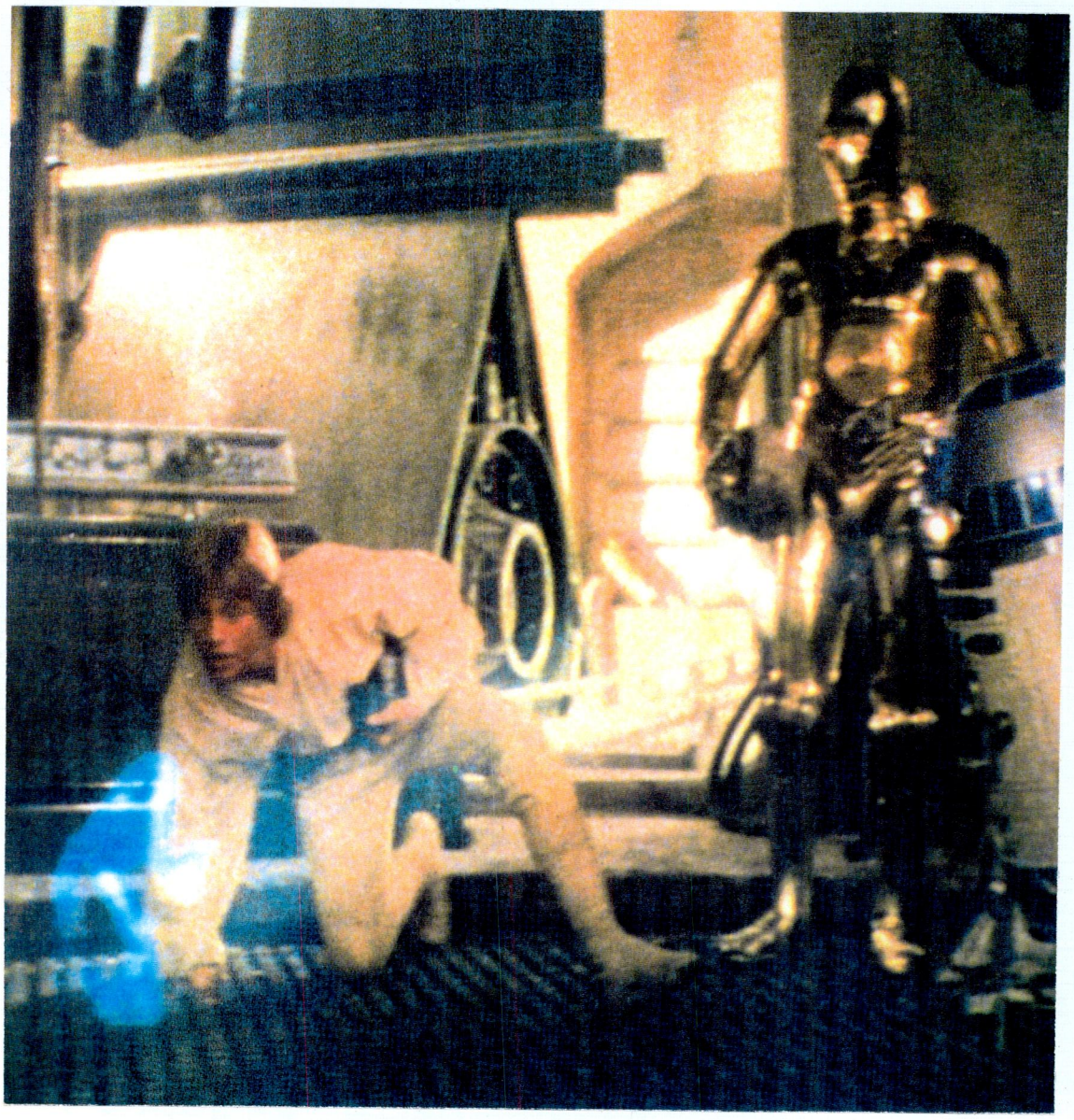

Figure 10 R2-D2 projecting princess Leia in *Star Wars*

In the building of tension, Imperial Tie Fighters scream ever closer to the Millennium Falcon until they are eventually blasted out of space. Directly after this shot the spectator is treated to a wide angle, overall shot of the erupting fighter. Explosions in the vacuum of space are an impossibility. In the film *2001 : Space Odyssey (1968)*, realism was taken at it's word. With no air, the opportunity for sound or explosions does not exist. Lucas, deciding that this was going to be the ultimate science

fiction film, took certain liberties in this regard. He made a conscious decision to go in the opposite direction and create a new phenomenon. Lucas saw that *2001* had potential but flopped because of it's dedication to realism, at the expense of entertainment value. Determined that entertainment value was more important than the factual value, Lucas set about writing *Star Wars.*

With the creation of *Star Wars* came some new designs. The X-wing fighters, the uniforms and dialogue of the pilots, the realistic explosions which featured shrapnel and the serious war movie feel to the film are all innovative. If one takes a look at science fiction / effects motion pictures before 1977, there are no other films with sequences, designed and executed like it. Past movies are considered influences to be taped into. However, many of the visual effect achievements attributed to ILM, are in fact, accomplishments in sound effects. New sound effects added to the standard visual effects created a WOW factor within the cinema audience. Sound effects, from this point on, became an integral ingredient in the execution of the visual. The result is to heighten the tension of the visual through the use of the audio. This now meant the directors were using a tool (sound effects), to increase the power of another tool (visual effects).

The technology that had been created for *Star Wars* had been advanced and administered to produce new scenarios and departures for *The Empire Strikes Back.* For example the asteroid chase or the cloud city were both new ways of approaching a film sequence. The cloud city incorporated matte painting, front and rear latent image photography, which are traditional techniques. The factor that separates them from their normal mundane applications are the design of the city and the individual effects shots executed within this scene. The asteroid chase is a universally applauded sequence of effects. Brilliantly conceptualised, designed and storyboarded, along with good writing and editing, Irvin Kershner provided marked improvement in the way the effects were used. In giving every creature a character of it's own, Kershner provided a more than worthy sequel to *Star Wars.*

As if to prove the point that effects are ingredients of directorial style,

Richard Marquand directed *The Return of the Jedi* and set an all time low in the satisfaction of audience anticipation. When showing the Speeder Bikes travelling at speed through the forest (fig. 11), there was no moving shadow on the forest floor and undergrowth as if he wanted to show the effect was false and try to hark back to the days of the obvious car rear screen projections.

Figure 11 Speeder Bike, minus ground shadow from *Return of the Jedi (1981)*

Even the glamorised Ewoks were evidently midgets dressed in silly costumes as if to copy, and not improve upon, the horrendously pitiful effects of the late, great Japanese contribution to effects technology, *Godzilla (1965)*. There is little or no attempt to make their gestures and dubbing seem natural. Due to the lack of mouth action, and their noticeable human body movements, the effort to create the illusion, is not apparent and the effect just fails drastically. Beast believability is significant for the scene. Yoda's death describes a sensibility void between Marquand and a mentor director like Steven Spielberg.

Marquand would have viewers react directly to the demise of visual effects, whereas Spielberg would supplant emotional response.

Spielberg and Effects

ILM optical effects for *Raiders of the Lost Ark* were stunning. The effects required by such a movie are those used in many a B movie. Spielberg could easily have fallen into this trap and cheapened the look of the film. But the consistent art direction of Spielberg triumphed. When the Nazi jeep is going over the edge of the cliff, one can almost feel Spielberg bringing one in the jeep with them. Spielbergs ability to apply basic effects to a rudimentary idea, revoke complex effects for the climatic moments. He has with an curious sense of what the audience perceives to be fashionable. A prime example of this is the scene where the staff is placed into a hole in the map room. Light radiates from the second stone, in the sacred map room, when the staff is struck on the ground. This light then hits the head piece of the staff and channels it into a beam. Magnificent discovery is symbolised by the use of Godlike light rather than a demonic laser beam.

Spielbergs finesse associated with the effects' power defines ILM's fame for lighting, smoke, shadows, sparkles, fire, explosion, mechanical and optical effects. To differentiate between the Nazis, Spielberg creates distinguishing features, so that when those that see into the Ark are melted, they are recognisable albeit deformed. Including the facial expressions and character location (fig. 12). This particular illusion was very time consuming, it required immense manpower at a considerable expense. One wonders if digital technology, in it's present form, had been around when Spielberg was making this scene in '81, would each Nazi villain have been given his own shot by ILM, melting at an even slower, more gruesome rate? Not all the effects of this film can be attributed to ILM. Many of the practical and mechanical effects were done by Kit West (the skeleton-laden bungi stick, the low tech trap-doors, the Operation-game extractions, etc.), which contributed to the overall style of the finished product.

Figure 12 The melting Nazis from *Raiders of the Lost Ark (1981)*

Indiana Jones and the temple of Doom seems less interested in advancing effects and more concerned with hitting the audience over the head with them. As soon as the action starts they happen in fast and furious succession. Effect action shot after effect action shot, the previous pacing the latter, in a perfect example of Spielberg controlled mayhem.

In *ET (Extra Terrestrial '82)*, Spielberg grabbed the audiences attention right form the start and did not let go. Just like the pied-piper, he guided us from reality to fiction and back again, with a masterful display of control over human emotions and special effects. The film starts with a fade in shot of the space ship in a forest clearing. An aerial shot of the ship is used so that it never becomes frightening or intimidating because the audience are above and appear to be the dominant ones. This shot is very subtly executed and edited to integrate with the rest of the film. By the use of soft shapes and forms in the design of the objects within the film (the space craft and alien form), ILM subconsciously resigned the audience to anything alien. It gave a sense of security that nothing foreign would disturb the status quo. This allowed the audience to relax their natural defence to the unknown, and get on with being engrossed in the story. According to Steven Spielberg, writer and director, "You have to believe in reality before you believe in outer space." (Spielberg, quotation, Combs, 1979, p.112.)

Elliot's graceful bike ride across the forest sky, silhouetted by the moon, was not a well produced effect (fig. 13). The matting was of terrible quality and flaws were obvious. The ILM effects in this sequence were low budget and low quality, but that didn't matter. Spielberg's grip upon the cinema audience was so strong that to imagine anyone, so emotionally detached at that moment is inconceivable. Spielberg displaces the emotional response to ET's death entirely through the human participants in the drama, particularly Elliot and does not need good effects to tell his story. The effects didn't need to be of superb quality or have a high credibility factor. These are all prime examples of effects being used properly, as a tool and not effects for effects sake.

Figure 13 Final composite shot of ET., Elliot and friends from *ET : Extra-Terrestrial (1982)*

Willow (1988), pioneered the first use of the morphing technique. The transformation of the good witch, Fin Raziel back to her human form, through various animal stages. A two headed dragon features in its most exciting action sequence (fig. 14). This is well employed in the storyline, so to make the battle sequence on-going and takes the action further than had it been approached from a different angle.

Figure 14 Animation of two headed dragon in *Willow (1988)*

Go-motion is applied here excellently in one of ILM's proudest achievements. The dragon was filmed in daylight, using go-motion, and interacts, as if seamless, with the real-life footage. As if to spit in the face of difficulty, moving cameras were used. This meant that both scenes had to match frame for frame the camera angle being shot from the other camera so that when joined the effect would be perfect. Here is shown a development of the old movies containing dragons, using stop-motion (Ray Harryhausen's King Kong) and slow-motion footage of lizards. Technology moved again to update this traditional story telling subject. All the effects in this movie were subtle and did not once infringe upon the audiences sense of realism whilst immersed in the world of fiction.

The *Abyss (1989)* is the perfect example of ILM and other effects companies working within the same film project. ILM only did the probe (pseudopod) scene. An Alien probe enters the sub marine craft in the form of a snaked shape body of water. It moves through the Deepcore habitat, and stops when it reaches the crews quarters, focusing it's attention on Lindsey. This proves her belief that there is an extraterrestrial intelligence at the bottom of the Atlantic ocean .The Alien probe then tries to establish contact with Lindsey and Bud, by mimicking their facial expressions, but pseudopod's investigation is made short by the Navy sailors, who consciously close the door upon it and sever the pod. The pseudopod, then returns to the ocean.

To create this effect, James Cameron (the director) contacted Phill Tipett, a former ILM animator. Tipett's initial idea was to use stop-motion, clay animated forms and then project water reflections onto it. Standing back and looking at the project, Tipett felt that a different method was needed. He arranged for Cameron to meet with ILM, and see what they could do.

After this first meeting, Cameron brought storyboards to ILM's Jay Riddle (Head of Computer Animation at ILM), who had previously made him more comfortable with the idea of using computers. Riddle was delighted to see something different. "Usually you get people coming in with ideas that are reminiscent of things and this was totally out of the

ordinary" (Riddle, quotation, Davis, 1988, p. 9.). Eventually computer graphics were chosen as a medium to be used, but only after all other avenues had been explored. This was due to the fact that Cameron had heard the computer graphics were not advanced enough, on top of the fact that there were very time consuming and expensive.

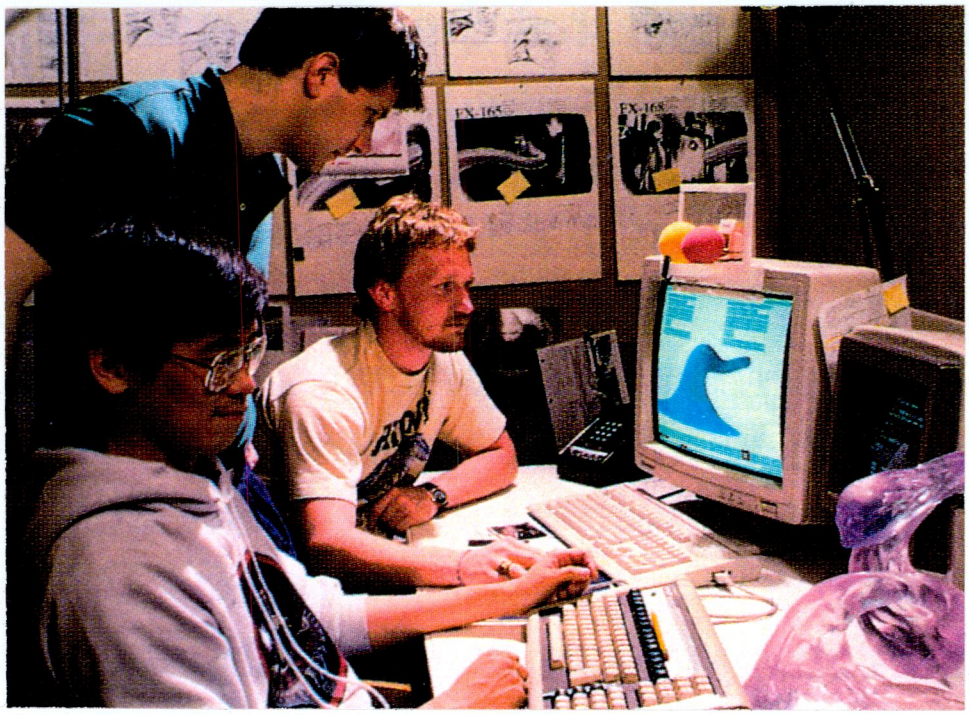

Figure 15 John Knoll, Lincon Hu and Scott Anderson animating the initial shape of the probe in *The Abyss (1989)*

Deciding on the exact movement of the pod was the first obstacle (fig. 15). Animators had to imagine what a body of water in a worm shape would look like, on the final film. More importantly they had to feel like the Alien or know how the pod should act. Being a concept exercise, the supervisor tells the animators his ideas which they then animate. They found themselves repeating this exercise over and over again, until they finally achieved a compromise of what Cameron wanted and what was possible.

Making the Alien probe resemble water in every way was the second stage in creating the pseudopod. Due to the many different factors which effected the light hitting the water probe in it's environment, this stage was more difficult than previously anticipated. After Riddle

and crew did some tests, they reached a point at which everybody was satisfied.

Problems were anticipated, if the environment, in which the film would be shot, was to change in any way. Therefore the computer software was programmed to understand what reflections and refractions were. This left Riddle and crew with the task of harmonising the two (fig. 16).

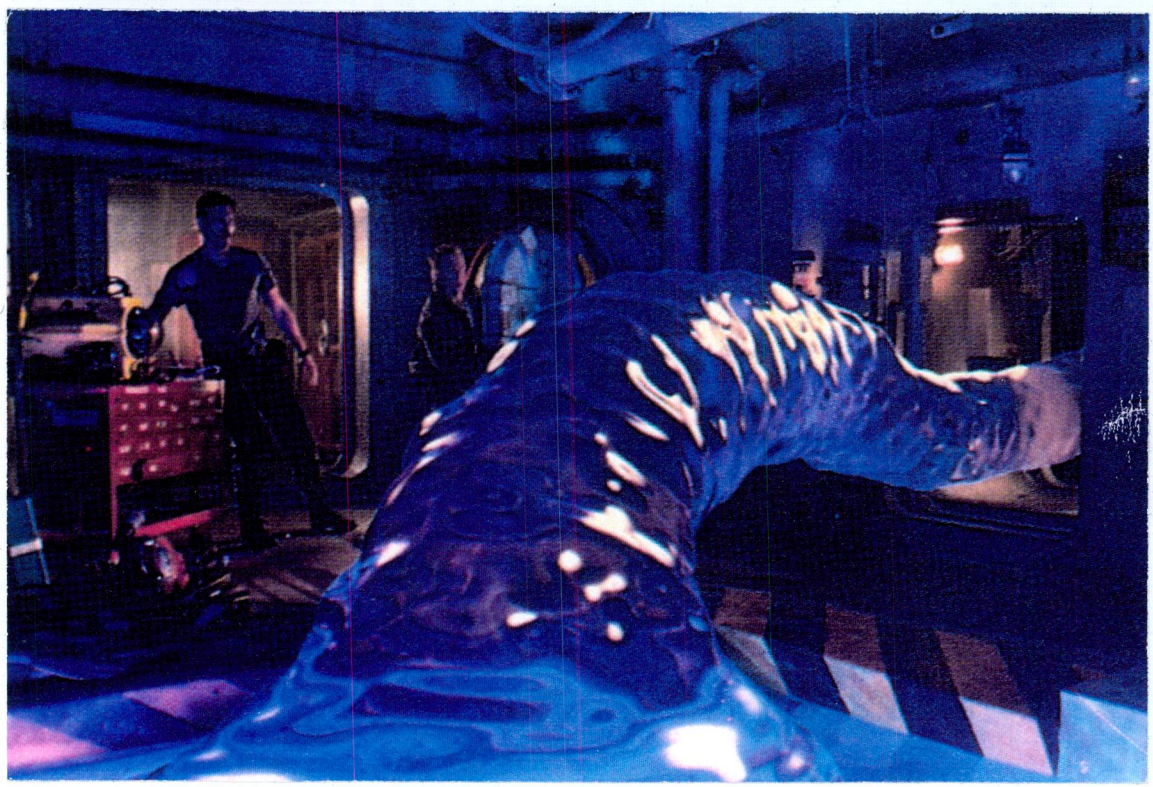

Figure 16 Pseudopod investigates the Deepcore habitat in *The Abyss (1989)*

If the object gets to much reflection and not enough refraction, it has the appearance of chrome or a mirror. If the object gets to much refraction, it does not really look like it's in the room because it's not reflecting enough.

(Jay Riddle, quotation, Cowan, 1990, p. 11.)

To create the psuedopod's mimicking of Bud and Lindsey's face (fig. 17), ILM used laser's to scan their faces in three dimensions. The light of the laser is recorded by a camera, digitised and then this information is fed into the computer. Eighteen different poses of Lindsey face and ten of Bud's, were scanned into the computer. These

acted as key frame positions for the faces. The computer, aided by new software, filled in the gaps. The computer then created the face on screen and colour was added by the animator.

Figure 17 Pseudopod mimicking Lindsey's face *The Abyss (1989)*

The effect that made the whole illusion gel together was when Lindsey poked her finger into the pod. Compared to the rest of the sequence this was easily accomplished. By use of matte painting and computer wizardry, her finger appeared to enter, dry, cause ripples and return with a droplet of water (fig. 18). Based on the movie going public's positive response and the rave reviews of the scene, it is clear to those that have seen it, are overwhelmed by the climatic psuedopod sequence, an effect unlike anything that had been done before.

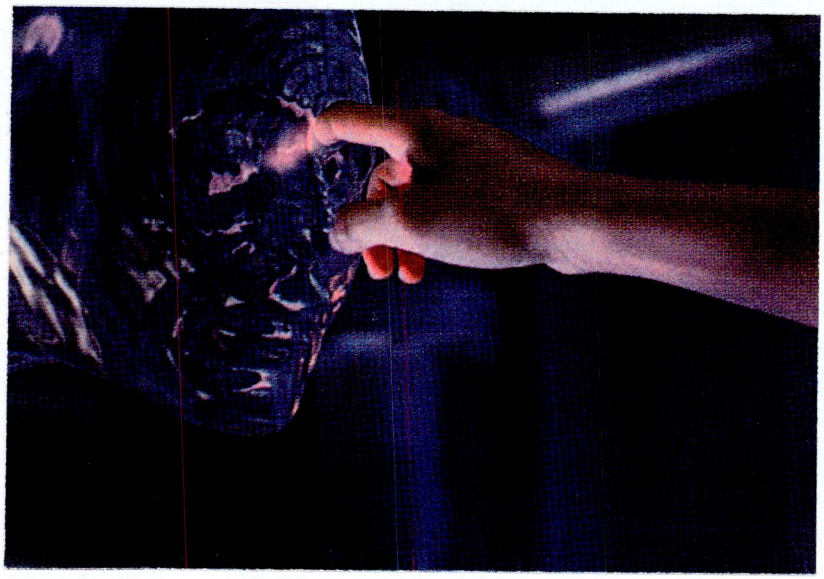

Figure 18 Lindsey's finger entering the Pseudopod in *The Abyss (1989)*

The shot of the surfacing Alien vessel that ruins the end of *The Abyss* is a pathetic abomination by Cameron. Dreamquest and Fantasy II Film Effects were responsible for this effect and all others (except the above mentioned by ILM). At first, underwater, the alien vessel is portrayed as a mystical and magical habitat made of human like tissue. When Bud was guided, floating through it's labyrinth like interior, a cord of awe was struck with the audience. When it rises, however, in the last scene it is obviously a mere monstrous hunk of plaster-paris. Did Cameron think that because it was at the very end of the film that no-one would notice, that they had already vacated their seats, leaving behind their squashed Pepsi cans, empty popcorn bags and were walking out the cinema doors?

Figure 19 The collapsing quarter scale model in *Backdraft (1991)*

In the film *Backdraft (1991)*, by Ron Howard, fire is portrayed as a villain. In one particular scene two firemen run along the roof top to escape as fire explodes, causing the building to cave-in (fig. 19). The viewer is placed high above the action, from a helicopter point of view. It was decided by Mike Nelson, Images VP of production, that there was no way to achieve this scene live, because the danger factor was to high to involve human life and was only going to be accomplished by the use of special effects.

ILM's Scott Farrar, Visual Effects Supervisor, was chosen for the job. Obstacles arose immediately with the use of fire in the scene, because

the minimum size that fire can be used on a miniature, and still appear to be realistic, is quarter scale. A miniature of the roof was built at a scale of 1:4. The scene of the seventy foot long, collapsing, miniature was shot at 72 frames a second.

Digital effects were utilised to matte in the running men onto the film of the collapsing roof. By using this method the finished film has no tell-tale flaws because it is in pixel form, where as with normal photochemical matte, the finished product has a blue line between the two images. In this case the arms of the men were only three pixels wide. It would be literally impossible to matte something that small without an edge from photochemical processing. ILM's aim was realism and they accomplished their goal.

Joe Johnston, when directing the *Rocketeer (1990)* for Walt Disney, required that an actor appear to fly against a blue sky. Previously, matting would have been used. The results, were predictable, it would have been a disaster. Matting a fast moving

object against a blue sky causes the matte lines to stand out like sore thumbs. Dark star filled skies are preferable for realism when joining travelling matted objects. If a director is determined to matte onto a light blue background, it is then a matter of choosing the lesser of the two evils. One is, heavy density matte which causes an crude edge, where the blur should be. The second, a light density matte which allows bleed-through and has an inclination to look like a double exposure.

> I knew we were in for trouble from the moment I read the script and it said 'EXT.DAY' Rocketeer flies above Hollywood Hills'. Johnston and I discussed alternatives and we decided to achieve it digitally and specified which ones would be done this way, as not all of them needed it.
>
> (Ken Rolston, quotation, Davis, 1990, p. 11.)

To create the illusion of flight, the flying objects must be photographed in front of a blue screen. Objects shot against the blue screen involved actors suspended from the roof by cable and stop-

motion puppets. Once finished the film was then handed over to Stuart Robertson, ILM digital Effects Department Manager. The test results convinced any non believer of the realism this method for creating the illusion. For the same reasons, as explained previously (section on *Backdraft*), matte lines disappear and blue spill were no longer apparent (fig. 20).

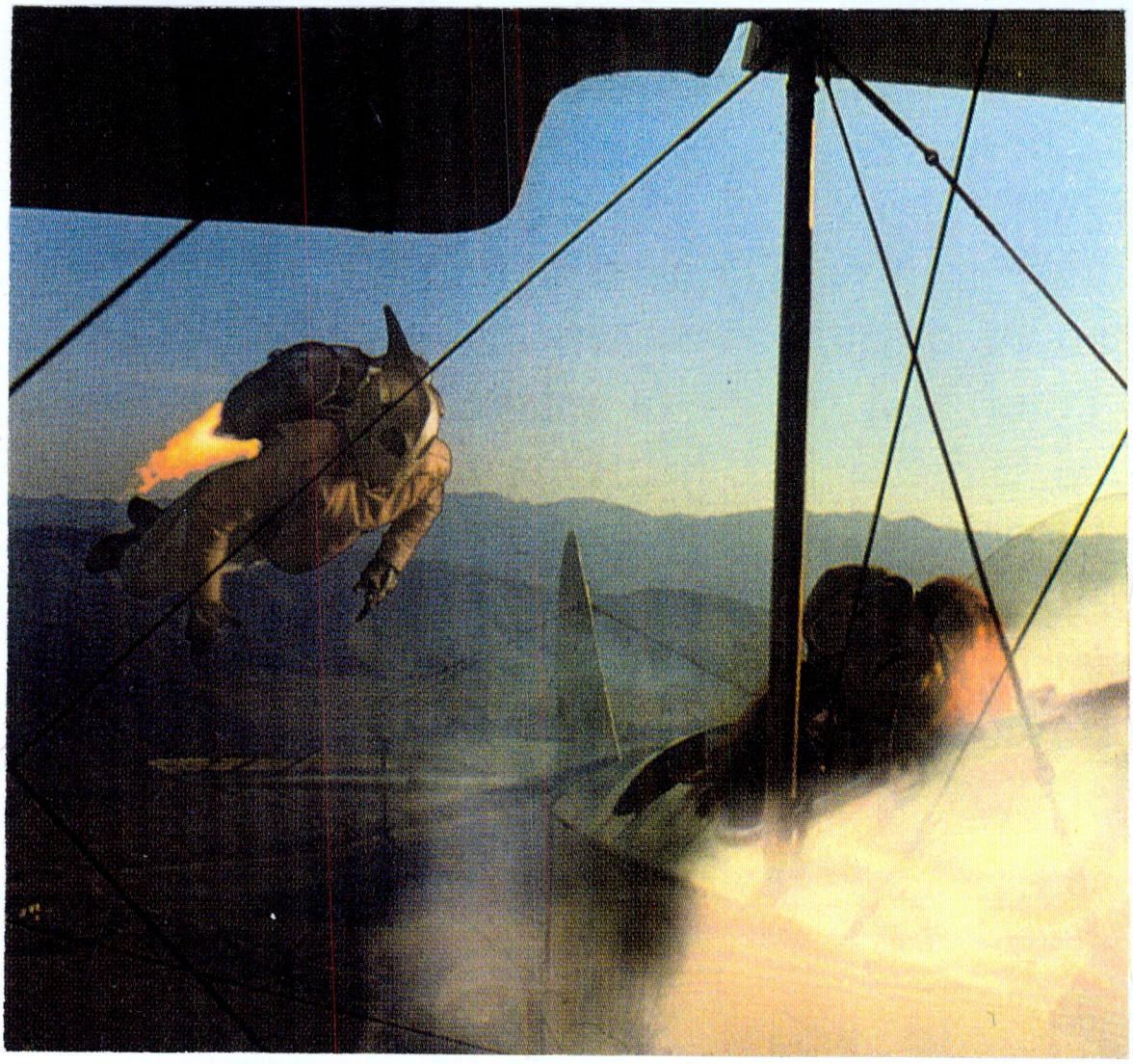

Figure 20 The Rocketeer flying along side a plane in *Rocketeer (1990).* Note absence of blue spill

An enthusiastic Ralston believed that the *Rocketeer* would have audiences cheering, not because of the effects but because the effects did not get in the way of the storyline.

> People believe they are actually seeing the hero flying across the sky and landscape in pursuit of justice, and there are no ugly matte lines trailing him to destroy the illusion.
>
> (Ken Rolston, quotation, Davis, 1990, p. 11.)

Full animation was used in *Who Framed Roger Rabbit (1988).* This meant that rather than shooting two or three frames with the same picture, which is the normal procedure, each frame was give was shot with an individual picture. Consequently the irritating strobe effect with normal animation was lost, thanks to the pain staking work of Richard Williams and his team.

Another break with the traditional integration of live action and animation was the use of a mobile camera (fig. 21). This meant that rather than using a locked down camera and photographing the live action, the actors are moving around and say their lines to things that are not there, only then are the missing characters are drawn in. ILM requested this obstacle, not merely because they strive on difficulty, but because ILM believed it would create a better end product. The aforementioned deterrents (Puppeteers, the use of soft focus, a variety of shadows and highlights) all contributed to the realism of the film.

Figure 21 Bob Hopkins meets Jessica Rabbit in an excellent mix of animation and reality in Who *Framed Roger Rabbit (1988)*

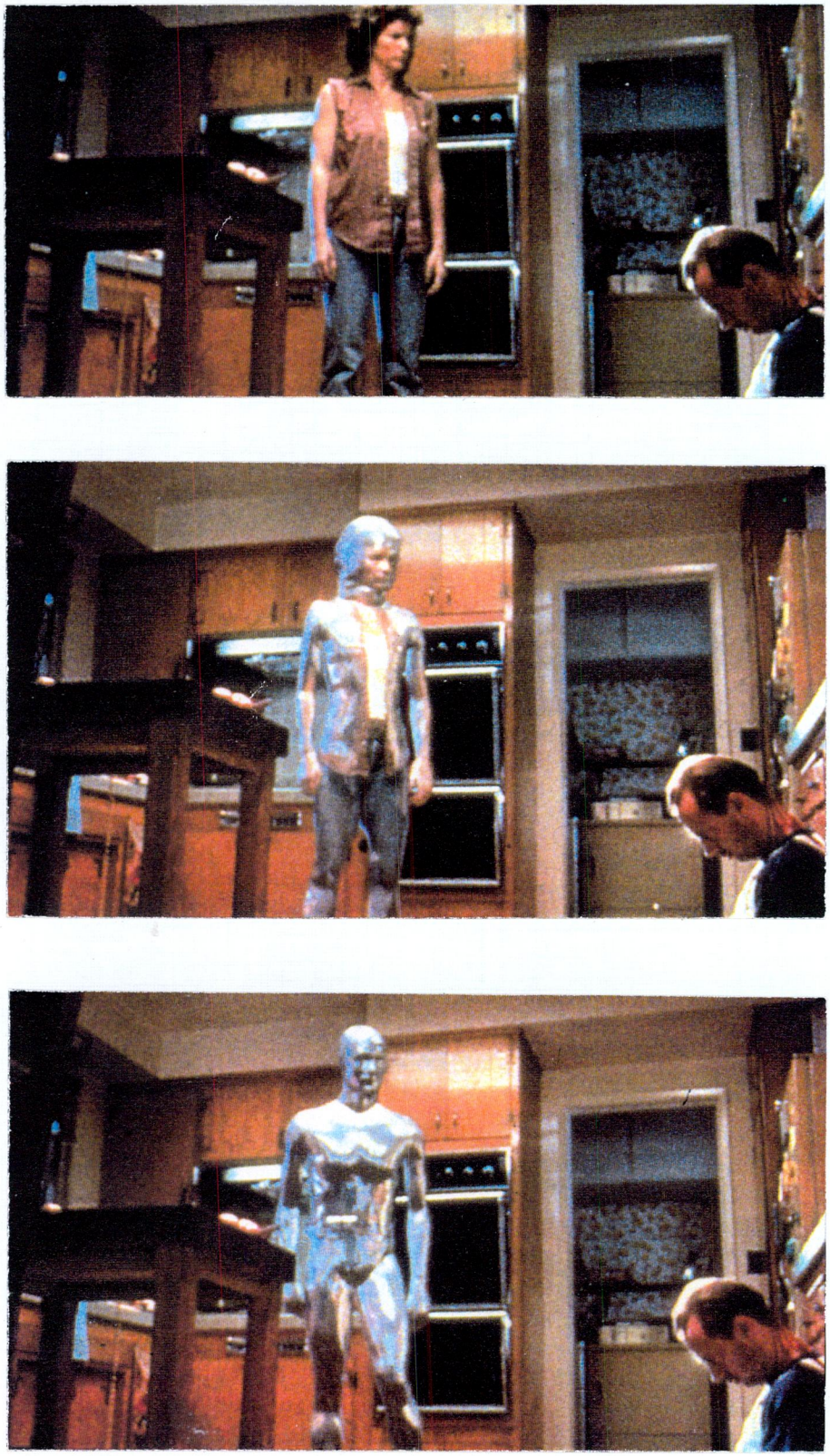

Figure 22 The Judgement Day (1990)(T2) use of flamboyant digital imagery stunned audiences. Here it is shown using Morph.

Since the creation of Star Wars there had been no other film that had come so imminent to challenging the barrier between realism and implausibility, as *Terminator 2 : The Judgement Day (T2)*. The adolescent and frantic film, *Terminator 2* added a new dimension to the effects revolution. The fascination for audiences lay in it's use of flamboyant digital imagery (fig. 22). The effects in *T2*, antiseptic and soulless though they were, provided a new stepping stone, and lease of life, for the, previously considered unreliable, computer generated imagery. Computer animation took years longer to take off than anyone had anticipated. Good computer effects have been used in films such as *Young Sherlock Holmes, Star Trek II, IV, Willow* and *The Abyss*, but *T2* was the movie that gave a real impact and advance. Digital effects had had a low profile before *T2*. It was the first to use computer animation extravagantly and spectacularly.

James Cameron chose ILM for the computer graphic work on *T2* because they had already proved to him the advantages of using them in his earlier film (*The Abyss*) in a scene which involved making a computer animated probe of water travel around a sub-marine. After all Cameron's inhibitions about using computer graphics in *The Abyss* had been annihilated by ILM, he wrote *T2* obviously with his experience of ILM, and what could be achieved, in mind. The computer animation bug had bitten Cameron and it would have been easy for him to make an effects film for effect sake. Thankfully the plot was not discarded and was treated, as it obviously should be, as an integral part of making a film classic.

The film was based around a killing machine that could transform itself into any shape it touched, the T-1000 Terminator (T2). In science fiction terms, this is by no means a new idea, but the concept was portrayed in such a way as to capture excellently the obscure, equivocal future characteristics of the computers.

Unlike Cameron, Brett Leonard who converted a seven page Steven King story into a one hundred and twenty minute film, The *Lawnmowerman (1992)*. Leonard, inspired by the success of Cameron's T2, ploughed into the making of the film with a relatively small budget

of ten million dollars. But there were gaping holes in the story. For instance, how could (the Lawnmowerman) have got himself and Marnie Burke (him neighbour) into virtual reality laboratory without alerting anybody's attention. Yet when the monkey at the start of the film tries to escape he is suddenly swamped by guards. Also, the absence of lab. technicians was always astounding. Surely, with the importance and scale of the project that our confused hero, Prof. Laurence Angelo (Pierce Brosnan), was working on, he would have needed several under graduates. The final results caused Steven King, who had originally been enthusiastic about the project, to pull out and not allow his name to appear anywhere in relation to the film. Leonard had got the ingredients wrong. The storyline was seriously flawed The effects technology used, the main and wrong reason for doing the film, which Leonard hoped would sell the movie, were simply rehashed computer generated and animated effects, pioneered ten years ago in Walt Disney's *Tron (1982)* (fig. 23, 24). One gets the feeling that Leonard should have taken heed of the God father (George Lucas) of ILM when he said "Special effects are just a tool....without a story, it's a pretty boring thing"(Lucas, quotation, Solman, 1992, p. 32.). This film insults the intelligence of the film going audience in it's pretence to be a modern effects film, which it should never have tried to be in the first place.

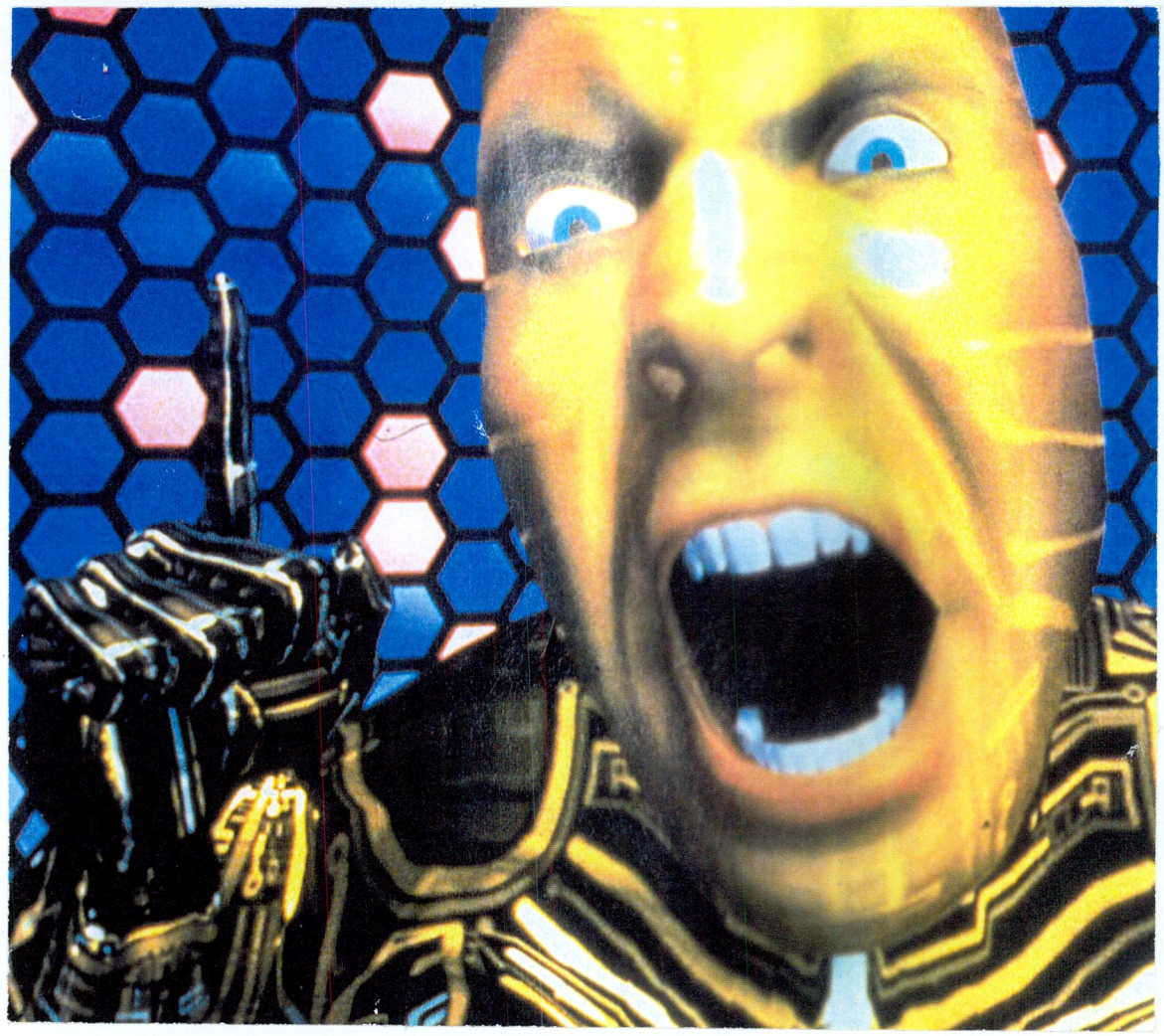

Figure 23 Jeff Fahey's face is computer generated using dated equipment, in the *Lawnmowerman (1992)*

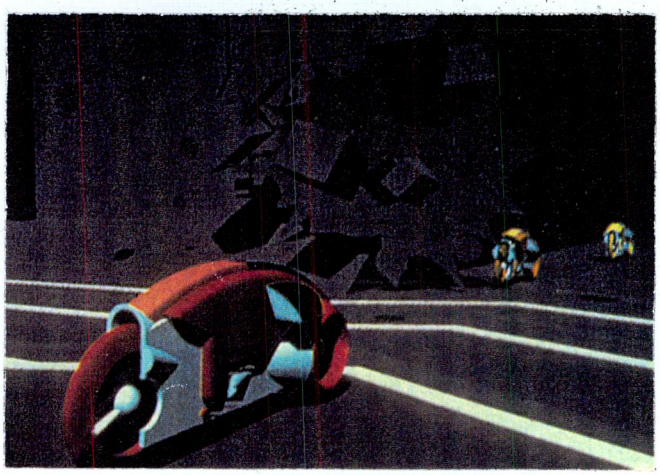

Figure 24 The effects of the *Lawnmowerman (1992)* used the same technology as those in *Tron (1982)*

Chapter 4

T H E F U T U R E

The path of cinema history is charged with gimmicks designed to make the cinema experience just that bit more realistic. The years '52 to '54 saw a boom in the 3D films. Film-makers thought they had hit upon the cinema technique of the future. But as we all know it's life was short lived. Cinerama is a system readily available made by IMAX. It is based on the fact that the bigger the screen the less likelihood that one will be aware of the edge of the screen, and the more realistic the film becomes. It projects a 70mm negative onto a surface up to seven stories high. IMAX have also introduced advanced goggles that help to make their 3D Solido system as real as normal eyesight. It may be tasteless, but what IMAX really want to do is project directly on to the retina of the viewer, by use of fibre optics. Even more tacky is the invention of Smell-O-Vision which was used in the film Scent of Mystery. Which, just as the name suggests, brought smells, contained in a rotating drum, through tubes into the cinema.

Computers generated special effects are in their infancy. The digital computer techniques such as Morph, first use in the film *Willow* and later over used in *T2*, are considered by ILM as mere stepping stones to creating the effects of the future. Morph created the "WOW" factor with media audiences world wide, when it was first introduced. This made filmmakers, television and advertising companies excited. It was a new way to flabbergast audiences with visual effects, and therefore go to see their films or purchase their products. The software used in television for morphing has been widely available for the last five years and in cinema for the last two years. So wide spread is the use of Morphing that the general publics visual entertainment outlets have been bombarded by this particular effect. But just as Twenties audiences became bored with the spectacular stunts, because they realised the formula to create the illusion, so Nineties audiences grow

impatient with optical magic, such as morph, demanding new and more stunningly amazing effects. With the result that the WOW factor has worn off.

There is the possibility that, filmmakers blinded by the excitement of such new tools, could be distracted from their primary aim by the WOW factor into creating effects films for effects sake. As previously mentioned in the criticism of Brett Leonard, the prime aim of film making is to tell a story. To make the act of story telling, through the medium of film, more believable, filmmakers utilise the tool of special effects. Special effects must never be more important than good storytelling.

At the moment Spielberg, with ILM, is editing a feature film called *Jurassic Park (1993).* It is claimed by the PR people that this latest Spielberg offering will make *T2* look as dated as it itself did *Star Wars.* Whether or not Spielberg achieves this claim, there is be no doubt that computer soft ware in this area is developing at a phenomenal rate.

Modern storytelling, in the form of effects films, has been preoccupied by the subjects of the deterioration of modern society and the creation of Cyborgs to protect or destroy the human-race. This is an indicator of what to expect from script writers in the future. Stories of cyborg-like zombies did exist before, such as *Frankenstein's Monster (Shelly, 1969),* but did not have the facility of visual effects to help tell their story true to the authors imagination. *The Metropolis (Lang, 1926)* is a prime example of the early twentieth-century's enchantment with technology.

Nowhere is the fusion of these two boundaries more apparent then in the films *Robocop, Terminator* and *T2. Robocop* deals with the topic of a decaying society, only held together by the police force, in the for of a half human half machine cyborg. *Terminator* and *T2* deals with the topic of the human races survival, in the form of one man, yet to be born, and his mother, in the forewarned aftermath of a nuclear holocaust.

The most useful new development is digital compositing (used in *Backdraft* and *Rocketeer*). Its main advantage over it's predecessor lies in the fact that there is no loss of quality, as the compositing is done on the computer. The finished product being a first generation piece, is more time and cost efficient.

Near future developments lye in imperfections. At the moment computer effects are distinguishable from reality because they contain no imperfections. Computer animators are, at the moment, working hard to create imperfection software packages, such as fog and haze.

In the most recent ILM project, Death Becomes Her (1992), animators mixed actress' body parts flawlessly with computer animation. Steve Williams worked for ILM on the film, and spoke at the London Film Festival last November. He predicted that with this step under ILM's Belt, that soon we could see footage of dead presidents giving speeches, films starring dead or retired actors, and even wholly digital actors.

In the near future Steve Williams can see the death of the flat cinema screen. It will be replaced by a confined area of gas, onto which a film can then be projected. This will create 3D holographic cinema. This will give rise to more lifelike cinema and more realistic special effects (Williams, quotation, Enfield, 1993, p. 328.). The knock-on effect of this will be Interactive Cinema. It is definitely a great distance into the future but Interactive Cinema will allow the cinema audience to interact totally with the film by making them appear to be 3 dimensionally involved, using virtual reality. It also hopes to eventually give the audience the capacity to determine the film plot by giving the audience certain choices to make whilst viewing the movie.

C O N C L U S I O N

ILM has determined it's own success, by creating a visual sense which evokes the WOW factor in audiences. ILM has fashioned it's style so well, in pop-film-culture that it has become a dominant influence on modern effects film making. ILM is the first choice of every director for the effects they require, because of its credits history. In the areas of planning, co-ordination, visual style, pacing and editing ILM have created a winning pattern of approach, which they apply to each project. Originally ILM set the film's aesthetic agenda. Today ILM has still has a visual style of quality in everything done by them, but the hardware required to produce such effects is also used by the majority of companies in the industry. ILM's pedigree work force, magnitude and in-house created software are the areas in which ILM are ahead of its competitors.

ILM consider the past a vital source of information. The main advantage of interpretation for ILM is that they can take from a visual reference, scenes and effects which will have the required effect on the audience. These old scenes have the inherent advantage of being tried and tested which is of paramount importance because of the phenomenal amounts of money involved in each of their projects. ILM can then update and upgrade the shot, by use of modern filming, editing, pacing and effects techniques. However this approach it's down side, being that ILM are solely progressive, and not innovative. Their defence is that they are primarily a profit making business.

When viewing *Star Wars* today, the effects seem critically flawed. Lucas's obsession for giving certain items the appearance of being battle worn was taken to extremes by the ILM crew (as shown by R2-D2's projecting a 3D hologram of Leia with annoying scanlines). Also, the fictional content of *Star Wars,* in comparison to *2001,* is very, high in it's pursuit of a science fiction storyline. For all it's misgivings, *Star Wars* still leaves the audience awe-struck. Directed by Kershner, *The Empire Strikes Back* is a masterpiece of science fiction story telling.

Superbly written, conceptualised, storyboarded and edited. It is an excellent sequel to *Star Wars* . Marquand made *Return of the Jedi* more of an ironic tribute to *Godzilla* than the third film in the *Star Wars* trilogy. It destroyed the audiences expectations of satisfaction, set by the previous two movies.

Spielberg's Indiana Jones and *The Temple of Doom* utilised old B-movie type effects, to formulate an intelligent piece of film making. The effects, previously associated with the word cheap, had an abundance of visual style. Spielberg and ILM, were less concerned with inventing new dazzling effects and more preoccupied with creating quality effects and piling them on fast and furiously, one after another. *ET (Extraterrestrial)*, also directed by Spielberg was an excellent illustration of how effects should be employed. They were utilised, by ILM, only when needed as a device to help narrate the story. Even when applied, there were only of the quality required to hold the audiences sense of realism. Elliot's death scene is less dependant on effects because of the high level of emotional response evoked in the audience. Spielberg's use of inferior effects therefore sufficed. This film contains paramount examples of effects being used appropriately, as a instrument and not effects for effects sake.

Backdraft used technology to digitise images and matted the picture onto the final film. The new process's advantages over the old method was the loss of photochemical light blue lines, and the ability to matte small images that was previously impossible. The *Rocketeer* advanced even further the use of digital matte. It created larger images against a blue sky background. Before this was always a headache and avoided.

Who Framed Roger Rabbit was shot integrating live action with animation full. A classic and an excellent film, ILM set new standards for the animation industry.

Willow was the first in a series of films to use the ILM invented software package called morph (or morphing). It is ILM's pride and joy for another reason, the two-headed dragon action sequence shows there best ever use of go-motion. The next ILM movie to use morph and

computer animated graphics was *The Abyss*, directed by James Cameron. This film shows how other effects teams work. Fantasy II Film Effects and Dreamquest did the effects for the rest of *The Abyss* . Between them and Cameron they destroyed the final sequence. The alien vessel that rises to the surface comes across, to the audience, as nothing more then massive blob of plaster. *Terminator 2 : the Judgement day* , also directed by Cameron, brought reality frighteningly close to fiction. It also affixed a new dimension to the effects revolution started by *Star Wars*. The effects in *T2* created the firm stepping stone that is now in place for computer generated animation which had previously been untrustworthy.

The Lawnmowerman pretended to be in the same league as *T2*. The story was so warped and far from the original that it caused Steven King (the writer) to not allow his name in the list of credits. The technology used was pioneered ten years ago by Walt Disney in *Tron*. This film used inferior effects for effects sake which is entirely the wrong reason for employing effects.

Overall ILM have not yet created an effect that was a failure, using Spielberg's effect assessment criterion. According to Spielberg, the audience should see the piece as a reality rather than an effects shot. (Spielberg, quotation, Combs, 1979, p. 127.). This is a major achievement considering the amount of projects ILM have worked on over the years. ILM's track record ensures their favour with future directors.

Gimmicks have been used in the past to entice the public to go to a movie. Modern effects tools, once used for the wrong purpose, become gimmicks. Audiences are becoming more impatient with effects techniques just as they did in the twenties. These computer generated effects are also replacing conventional method of effects creation, due to their decreasing costs and increasing applications. They are being used in films that are not science fiction or effects films, such as *Backdraft*, where they are not recognised as computer effects. There has been a outburst of cyborg films. These look set to continue being produced. This suits ILM effects technology as it stands, but they also now have the ability to reproduce and morph skintones (in *Death*

Becomes Her). This means ILM can now create a whole movie, actors, backgrounds, cars, dogs, all from a silicon computer graphics terminal. Also, there is a tendency for script writers, when audiences become bored with modern topics, to abandon the modern trends and look to the past.

With computer effects in their infancy and the revelations that technology could create in 3D projections or Interactive Cinema, the future of effects looks set, more than ever before, to deal with realistic cinema storytelling. One must mourn the loss of the great effects created by Stop and Go motion *(Jason and the Argonauts, 1969, and Star Wars, 1977)* and cannot help embracing the effects now being created by silicon computers.

Will there come a day when what you get will be so real, you won't know whether you are actually battling with *T4 : the Eliminator* or experiencing another classic ILM movie? The possibility that cinema audiences of the future will be treated to *The Empire Lives On : Star Wars VII,* in which a three dimensional Luke Skywalker will battle with Darth Vader in the aisle of the cinema, that the smell of clashing light-sabres will invade your nostrils, does not seem all that futuristic any more.

Could the possibility that in the future, like Quaid in *Total Recall*, one will be able to escape reality by having a memory implant and taking a short holiday in cyber space? Like the reality researchers in *Brainstorm (1964)*, one will be able to experience love, sexual orgasm and ultimately death, then remove a tiny headset, hop off the bus and go to work. The possibilities are endless.

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