

THE CATEGORIZATION AND USE OF 3 DIMENSIONAL COMPUTER
GENERATED SPECIAL EFFECTS IN FILM

Charlie Johnson, B.A.

Problem in Lieu of Thesis Prepared for the Degree of

MASTER OF FINE ARTS

UNIVERSITY OF NORTH TEXAS

May 2000

APPROVED:

William R. Pensyl, Major Professor

Michael Gibson, Minor Professor

Jennifer Evens, Committee Member

Marion O'Rourke-Kaplan , Design Division Chair

Dr. D. Jack Davis, Dean of the College/School of Visual
Arts

C. Neal Tate, Dean of the Robert B. Toulouse School of
Graduate Studies

Johnson, Charlie, The Categorization and Use of Three Dimensional Computer Generated Special Effects in Film. Master of Fine Arts (Communication Design), May 2000, 32 pp., 6 illustrations, references, 17 titles.

There has been a growing trend in the film industry in the use of three dimensional computer generated images (3D CGI) for special effects. With the popularity of this relatively new medium comes the need for new terminology. This exploration developed a general system of classification for 3D CGI effects for use in film. This system was based on a study of various writings about the significant films, which employ 3D CGI effects.

A three-group system of classification system was developed. The three-group system was composed of the *Elements Group*, *Level of Reality Group*, and the *Kind Group*. These terms were developed to aid in the day-to-day production of 3D CGI special effects in the future.

Copyright 2000

by

Charlie Johnson

TABLE OF CONTENTS

| | Page |
|--|------|
| LIST OF ILLUSTRATIONS | iv |
| Chapter | |
| 1. INTRODUCTION | 1 |
| Statement of the Problem | |
| Definition of Terms | |
| Sources of Data | |
| Methods of Procedure | |
| Significance of the Problem | |
| 2. COMPREHENSIVE EXPLORATION OF SIGNIFICANT THREE DIMENSIONAL COMPUTER GENERATED SPECIAL EFFECTS PREVIOUSLY CREATED FOR FILM | |
| Brief History of the Creation and Use of 3D CGI Effects Used in Film | 12 |
| An Analysis of the Use of Previous Terms Used to Talk about and Describe These Effects and the Creation of New Terms | 17 |
| 3. CONCLUSION AND SUMMARY | 27 |
| APPENDIX A | 30 |
| Illustrations | |
| REFERENCES | 32 |

LIST OF ILLUSTRATIONS

| Figure | Page |
|----------------------|------|
| Illustration 1 | 30 |
| Illustration 2 | 30 |
| Illustration 3 | 30 |
| Illustration 4 | 31 |
| Illustration 5 | 31 |
| Illustration 6 | 31 |

CHAPTER I

INTRODUCTION

CG SFX TERMS IN FILM

There has been a growing trend in the film industry that has been building for some time in the creation and use of special effects with the use of three dimensional computer generated imagery (3D CGI). This trend has to do with the process of creating realistic or surrealistic imagery, usually with the intent of having it seamlessly integrated with the film elements in the various segments of the film. The occurrence of this trend building has mostly been fueled by the growth of cheaper software that, unlike its predecessors which ran on expensive proprietary systems, runs on personal computers and common operating systems. The goal of the seamless integration of these new effects is driving in part by the criticism about films with “fake-looking” or “bad” effects in the past. Most viewers are more sophisticated and many are hip to the techniques and processes of special effects, and having been exposed to many films with outstanding examples of earlier techniques of film effects, are quick to point out “flaws”. The goal of the relative quality of an effect, in theory, comes from the level of believability it elicits to the viewers that the element is part of the real-life scene due to the “suspension of disbelief”. The amount of leeway a viewer will give to movies in general allows it to seem real to them. Filmmakers now have a number of ways to create these special effects from lighting, puppetry and explosions to digital film compositing and 3D CGI, with the ultimate goal of adding to the filmmaking team’s ability to tell a better story.

This later way of creating effects with three dimensional computer generated imagery is one of the newest and most popular of the new developing techniques. When discussing a young art form like 3D CGI, one can see how it borrows its identity from older art forms, and search to find its own by making these new forms. Often the occasion of a new art form that the early terminology of concepts and procedures are borrowed from it's older sibling art forms. Often too, these descriptions are too long or convoluted, and at some point change and become more standard and somewhat universal. This exploration will develop a general system of classification for all types of three dimensional computer generated special effects for use in film based on a detailed study of many of the previous effects were created. It will also contain a general explanation of how each class of effects might be created, and out of this, attempt to develop a standardized system of general terminology that can be used to describe these classes of effects.

One can imagine how this took place early in the evolution of drawing, where an artist has to explain to another that she/he should make a greater distinction between the value of the darkest dark and the lightest lights. Eventually someone coins the term 'contrast' and ends up being defined as 'the difference, as in color or tone, of adjacent parts of a drawing'. In this way the term becomes a universal lingo that people share and can use when discussing, and resolves the issue of confusion or lengthy explanations when discussion art, or any idea for that matter. This is why we use words, as common terms that stand for ideas that aide in communication to each other. Later art forms, which use this same idea can borrow a term and even modify the definition to apply it to a similar idea in painting, photography, videography, or any similar art form. That is

where all art forms terminology starts, with common terms borrowed from previous ones, then the development of it's own specialized terminology. Along with the development of the terminology runs the theory and the reasons why artists are doing the various things they are coming up with this terminology.

In the last twenty years the field of computer animation has come a long way from being experimental to a common art form used in filmmaking, and like any relatively new art form, comes the trend of lingo used to describe the process. This trend of early confusing terms used to describe these effects has become more evident now that the discussion about these effects has leaked into the popular culture via television programs that show and explain how these film effects are created. Current films like *The Matrix* represent a “giant leap forward in the field of virtual cinematography” and has brought these early ‘convoluted descriptions’ to the public eye with terms like “Flow-Mo” and “bullet time”. One of the problems with the current use of effects is the proliferation of practical writing of the ‘How’, and little critical writing about the theory of the ‘Why’ in the creation and use of these effects. Out of the discussion of both the ‘How’ and the ‘Why’, comes the necessity of a classification of what has been and can be done and the start of a common processes and terminology with which to talk about these ideas. Many times the special effects production houses (post houses) that create these effects come up with the techniques ‘in house’ with some odd name for it that only makes sense to the production team. These definitions of what this name means and the process of its creation often stay ‘in house’. With the surge of these films employing more 3D special effects there is a push of young artists willing to emulate these techniques. The current state of sophistication in 3D CGI for film special effects has brought these

techniques to the forefront of many of the minds of the film industry. The recent push for these special effects has increased the desire for information about the production of these effects. This need could be fulfilled with a concise study and categorization of the effects that have been previously done, and logically subdivided into categories that would help in the construction of terminology to explain future effects.

The study could be constructed in the length of written article that could be submitted for publishing in a popular 3D or film magazine. Although the categorization and terminology which will be derived from such a study could benefit those involved in the application of effects for TV, animation (either through 3D CGI and/or other techniques), this would be too large a topic to undertake to benefit this study. It would be logical to restrict the focus to 3D CGI film effects only, and therefore restrict the scope of the research and exploration. This in no way prohibits the information would not be applicable to these other applications. The exploration of this study could be further explained in the form of various shots built for a film short. It would contain shots that explored constructed examples of these 3D CGI general terms derived from the study, with a description of the basic processes in the construction of that category. These shots would function as a pedagogical tool and a basic physical example of the term to add to the understanding which the viewer could see both the thinking and the process from the pre-production end of the process to the finished product. The study should focus on the following questions:

1. What are the possible terms for a general system of classification in three-dimensional computer generated special effects for film?

2. How will the development of these classifications and terminology help in the dissemination of ideas and concepts in the in the process of creating these effects; What will it prevent from occurring in future discussions on this topic?

3. What are the practical steps in the creation of a basic example of for one of these classifications, and the integration of the three dimensional computer generated elements with the film elements? Will it be universal enough and allow the reader to benefit from it?

The study will start with a comprehensive exploration of the significant 3D CGI effects that have been used in films up to the present. Due to the nature of this study, it will be logical to select films that contributed to some groundbreaking trend, or which contain outstanding examples of 3D CGI effects in the last few years. This study should contain enough examples of effects that obvious trends in either formal issues or “storytelling necessity” should arise. These trends should be succinct enough that they will allow a categorization that will lead to this system of general classifications that could be used to describe any effects possible for 3D CGI effects that might be used. One cannot assume to come up with categories to describe every effect that can be thought of, since if the classifications are made to universal, they won’t apply as much to the task at hand, and if to specific, may become too numerous to become useful. Once these classifications are devised, a concise starting title and definition for these categories should be developed.

Once the study is done, the physical exploration will culminate in a series of shots constructed for a possible film short which makes use of the theory and examples of some of the major classifications that surface from the study. The theme of the short will be derived from a science fiction theme, since science fiction is a more conducive to the exploration of these classes of effects. Since shots involving the integration of film elements with 3D CGI are usually expensive and complicated to get to work together, the process of doing the stories pre-production with extensive storyboards and pre-visualization animatics. This helps allow the film to be shot and planned out to integrate easier and 'more believable' with the 3D CGI images. Since the focus of the project is the visual effects, the film short will focus on the visual segments exhibiting the effects without the concern of the possible voices or sound effects. The film will likely be shot with betacam and/or low end 'prosumer' cameras, shot both in a studio and on location, where all the necessary measurements of camera distances and angles will be recorded in order to facilitate matching the motion that will take place later in compositing. The shots will be digitized with a digital capture card, and integrated into the pre-visualization animatics. The 3D CGI effects will then be created and cameras will be set in the 3D modeling and rendering software with the recorded measurements and angles taken in the recording sessions. Once a general simulation of the effect is constructed, a test render of the effect will be done and composited into the pre-visualization animatics to see if all the angles and timing work. Once the final texturing, camera and lighting adjustments are done, a final render will be integrated in the final composite. Then color and compositing adjustments can be made to give the effects the realistic or surrealistic effect each merits.

The final render of the composites can then be made, and edited and composited with to be put to tape for the final presentation.

The final presentation of the shots is undecided at this time, but will likely be shown on a tape format and/or on the Internet. Along with this presentation various pre-visualization explorations could be shown on tape or computer in addition to the storyboards, drawings and other creative work that will lead to the final product. The intent of the research is to add to the small body of critical writing concerning the construction and application of this relatively new art of combining 3D computer generated special effects and traditional film shots.

CHAPTER II

COMPREHENSIVE EXPLORATION OF SIGNIFIGANT THREE-DIMENSIONAL COMPUTER GENERATED SPECIAL EFFECTS USED IN FILM

A Brief History of the Creation and Use of 3D CGI Effects Used in Film

Many times movies begin “well, let’s start at the beginning”, but for the sake of this discussion, this story will start somewhere near the beginning. There is no doubt that people have been making movies for somewhere around a hundred years now, and in that time people have been doing “special effects” in these movies, whether they knew it or not. One could go back to 1857 to find one of the first examples of what would be known in photography as a ‘combination print’, but this discussions timeline might start sometime in the early 1980’s. Although the first digital creature for use in a digital film would come in 1985, it was primarily done with 2-D processes. The first instance of 3D CGI effects with the level of realism that most people associate with this term as it is thought of today probably started with the 1989 movie *The Abyss*. In this movie the special effects post house Industrial Light and Magic (ILM) was faced with the task of bringing a life-sized pseudopod creature composed of water to the screen. At the time, would take a Herculean task to bring to life the 25 seconds of 3 dimensional imagery. It would be the largest 3-D order to date. *The Abyss* segment stood as a landmark in the cross over of the CG department from producing small elements, to a driving force in the creation of primary elements in movies. The effects primarily created by ILM, which had originally been created for the production of the one movie *Star Wars* by Director George Lucas, still exists as one of the premiere effects houses to date (Dunignan 1996, p120).

The thought on *The Abyss* was to try the shot, and if it didn't work out, they could cut it out, which one will find many times when one reads about early 3D CGI effects.

In *Terminator 2*, director Jim Cameron would ask ILM to take the gamble to commit a large portion of the movie to the most fantastic creature to be taken on in 3D. Cameron's co-producer was heard to say, "I honestly felt that eighty percent of the CG effects in the script were impossible to do" (Dunignan 1996, p230). *Terminator 2* was also a stepping-stone to the momentum that would lead to the milestone of 3D CGI effects, *Jurassic Park*. This movie would bring to life a number of realistic looking Dinosaurs that were the primary characters for over 50 scenes in the movie, rather ironic that were originally thought to be done with mostly animatronics supplemented rather with stop motion than 3D CGI. The goal of creating a level of Artistic realism was realized in the animations that would bring a level of naturalism and believability that many believe stands as a benchmark for effects people strive to top still today (Cinefex 55 1993, p). Spurred on by the successes of these movies, studios would now take chances on movies that would have never been tried before.

After *Jurassic Park*, Universal pictures would take a chance on the 1996 fantasy *Dragon Heart*, with primary effects being done by Industrial Light and Magic. *Dragon Heart* was the fantasy movie about a friendship between a 10th century talking dragon and a disillusioned knight. ILM would pull off a minor miracle in designing a computer animated dragon test in two weeks, by copying and pasting together a crude but convincing dragon model to greenlight the movie (Cinefex 66 1996, p 44). Although it wouldn't be as a commercial success as *T2* or *Jurassic*, it would again raise the bar as to how prominent CG would become, where a CG character would exist essentially as the

star of a major motion picture. *Dragon Heart* contained breakthrough CGI character animation and the proprietary Caricature “Cari” software for facial animation, which an updated version is still being used today on current movies like *The Mummy*. One of the animators that worked on both *Jurassic* and *Dragon Heart* found himself saying at the end of *Jurassic*, he looked at the shots and said “Ho-hum, yeah, I guess that’s good” but after *Dragon Heart* found himself saying “How did we do that?’ It’s phenomenal. What we’ve done on *Dragon Heart* is right at the edge. It doesn’t get much harder than this” (Cinefex 66 1996 Heart, p 65).

The amazing thing about this whole process was at the same time they were working on *Dragon Heart*, ILM was also working on some of the effects for *Twister*. This was around the time where it seemed like every new blockbuster movie to come out would tackle some new unexplored facet of 3D-CG special effects. *Twister* would tackle the problem of recreating one of the most destructive and hard to reproduce natural phenomena special effects on film. Again the feasibility of the doing the movie would be dropped on the shoulders of a test shot done by ILM, which also shows how prominent ILM was in this early phase of special effects for film. As a matter of fact, one of the ILM visual effects producers stated that “They felt that if they couldn’t do it digitally, then there was no point in pursuing it at all” (Cinefex 66 1996 Riders, p.73).

The next big event in effects movies would come with the long awaited project based on Carl Sagan’s best selling book *Contact*. Although this film was not known necessarily like the other “special effects” films, there were many very impressive CG effects that added to the believability of this science fiction masterpiece. The special effects shotlist grew from 150 shots to a whopping 340 shots, and although Sony Pictures

Imageworks (SPI) did the primary special effects, eventually other vendors had to be brought in on the project. The primary 3D CGI effects would come in the form of the gyroscope shaped space machine with it's capsule, although almost 80 percent of the special effects shots were supposed to pass for everyday objects. One of the major players at SPI would explain that these shots, with the goal to be photo realistic, the people had to buy these effects in order for the ride to be believable (Cinefex 71 1997 Riders, p.73).

The next event in CG effects would come from one of the most ambitious and best examples of how the combination of traditional effects, CG effects and good storytelling could create one of the most beloved movies of our generation, James Cameron's 1997 masterpiece *Titanic*. Not only would *Titanic* push the limits of digital effects, but it would also push the limits of longstanding ways of achieving effects with some of the most ambitious and breathtaking visuals attempted. The process would include the deepest underwater dive shoot attempted, many often used but still dangerous stunts, and an expensive and heavy set which would come in just shy of weighing as much as the actual Titanic which would be lowered into a specially made lake (Cinefex 72 1997 p.5-19). One thing that the CG effects afforded to this movie that set it apart from past attempts to do effects for a movie set on such a large moving stage, was the fact that the artists could populate the shots with CG characters walking around on the ship. Unlike the less recent ways of populating a scene with people by shooting them on a greenscreen and shrinking them down, with the help of motion capture CG characters and ship the director the option of three-dimensional movement on the sweeping shots of the ship (Cinefex 72 1997 p. 32). Titanic would push to the limit of what a group of people

could achieve on a project at that time. With so many physical obstacles overcome, this would again add to the palette of storytelling ability afforded to today's directors, and Hollywood is still waking in the effect this movie had on it.

Although this study does not give itself to exploring in depth all of the movies that employed CG in some fantastic or innovative way, it is worth mentioning briefly some of the significant titles since *Titanic* which had some impact on the use of CG effects in movies. The summer of 1998 would bring a wealth of CG laden movies. *Godzilla*, although not as much a critical acclaimed movie, would push the sheer number of CG shots with the action filled cult classic being brought to life. The 'who gets the idea to the screen first wars' would continue in the form of the mirror releases about meteors with *Armageddon* and *Deep Impact*. The lower budget or more 'non-blockbuster' films would also benefit from beautiful CG effects with *Sphere*, *Lost in Space*, *Spawn* *Starship Troopers*, and *Babe: Pig in the City* and *The X Files*. 1999 would show the assertion of the new breed of software plus and a full circle restatement of ILM as the premiere effects post house and a reunion with its instigator with the releases of *The Mummy* and *Star Wars: The Phantom Menace*. This leads us to the cutoff point of this discussion, and possibly the best current example of this new breed of filmmakers that employ 3D CGI to add to the storytelling ability of the filmmaker in the *Matrix*. There probably are many movies that contain possibly better effects and most assuredly there are much better crafted movies themselves. These movies serve as good examples for the study since they are both more written about and stand out in more peoples minds, which is good when trying to explain the concepts of terminology and technique now because these images are burned into peoples minds. They also serve as good examples

for this exploration because many of these movies like *Jurassic Park*, *Titanic* and the *Matrix* should stand the test of time and still stand as landmarks in the history of filmmaking.

An Analysis of the Use of Previous Terms Used to Talk About and Describe
These Effects and the Creation of New Terms

The intent of this study was to lay the groundwork for the beginnings of a discussion about what direction that terminology regarding the combination of 3D CGI and other elements for feature film production might take. It should be noted that no one could assume to come up with a whole system of terminology that would apply to all situations and that would work for everyone. The businesses that create effects for TV and feature films are generally called post houses, and each post house or group of individuals will develop their own systems and terminology based on the experience and the specific needs of the specific facility or project for that matter. It would seem helpful to take a look at some of the literature about the existing body of feature film work, which contains 3D CGI effects. By looking at this discussion the intention is to try to find trends or similarities in the shots or the discussion of their creation. Since the creation of 3D CGI effects is many times a similar process to other ways of making effects it would also seem appropriate in this case to see what terms have been apportioned from these other processes. It would also seem logical to anyone who has worked with or read about the creation of these effects, many terms from the process of filmmaking itself or similar art forms have also been used. It would make the most sense in the case of this discussion to lay down a series of possible groups of terms to serve as guidelines for exploring. Then

by grouping the 3D CGI effects examples under these groups, one can see if these groups of terms aid in the understanding or production of these effects.

Keep in mind these terms will be in addition to the common terms one would use to describe a normal film shot or sequence. The basic categories of shots like long shot, medium shot, and close-up would also apply to these descriptions. The definitions of these descriptions have previously established where generally the long shot contains the whole subject, medium shot contains part of the subject like from the waist up, and close-up concentrates on a close shot like a head. There are other more specific descriptions like wide shot for a landscape, or an extreme close-up (EUC) which concentrates on a single feature like an eye. Shots can also have descriptions like point of view (POV), which would be a shot from an extreme vantage point, or a static shot (with no camera movement) versus a moving camera shot (Ascher 1999, p. 214-215). There are many more terms and definitions that are used, but it could be assumed for the sake of this discussion that a person which would be exploring the 3D CGI effects would be somewhat familiar with these terms.

For the sake of this discussion, the possible groups of terms will be limited to three: first a group that describes what elements could be or are used, and in what order of layering in the composition, second the level of reality, and third the kind of thing it's representing. There could be a fourth group used in the early discussion of 'the why' and the major reason why the group would do the effect with 3D CGI as opposed to another process. This group would not be used more in the early stages of pre-production, but doesn't seem as appropriate to the day-to-day discussion of how to produce the shots. The ultimate goal of a system of general terminology would be to aid and expedite the

process of explaining shots and their creation on a day-to-day basis, much like the established terms mentioned earlier. Although this group could aid in the storytelling aspect, it would to have the most benefit in the pre-production stages, and be more used in the discussions of budgetary or shooting concerns. By looking at the arrangement of the terms in a matrix, one could visually place an effects shot like many of the pod shots from *Contact* into each of the groups to give a comprehensive categorization of the shot (Illustration 1). One can see by the categories presented by this matrix that a large number of possibilities for categorization could be made. By knowing the general definition of each instance of these groups, a classification based on these terms can quickly give someone else a good idea of what the shot entails. This alleviates the process of having to take 5 or 10 minutes to give someone else the essential idea of what they are talking about.

The first group would deal with what elements could be or are used and in what order of layering in the composition, this could be called the Elements Group. The term element refers to the individual pieces from which one would create the final composite. An element could be film segments (or some other form of sequential shots such as video), still photographs (one or a series strung together) or capture of a still hand rendered graphic, 3D CGI images, 2D computer generated images or compositing effects (Brinkman 1999, p. 7). When compositing film effects, these elements are put in an ordered stack in the compositing program, and can be adjusted as to how they blend together or the time in which they come in. This seems like a logical term to use first to quickly explain to someone else essentially how the composite would go together.

Essentially one can come up with five basic instances of how 3D CGI elements and film elements can be composited. In reality each composite is unique and may consist of numerous layers of elements and ways of combining them, but when trying to define ideas in order to better understand them, one might use terms to explain the most basic instances of the idea, then to elaborate on these later. The first basic instance is a 3D CGI element can be composited over a film segment (keep in mind in all these instances the film segment can be replaced with a photographic still or other element). In each of these three instances, an acronym might aid in the use of the term in everyday speech, like in this case *CGI-F* could be used for 3D CGI over film. This is in most instances, depending on the complexity of the CGI element, the easiest type of effect to shoot for and composite (Illustration 2). Many of the shots of the dinosaurs in *Jurassic Park* could be classified in this group, where the CGI elements were composited over a background. The second instance in the *Elements Group* would be a film segment composited over a 3D CGI background or *F-CGI* (Illustration 3). Many of the shots in *Contact* had the main character shot on a blue screen, composited over the CGI pod. The third and fourth instances of the *Elements Group* are what one might call a ‘CGI Film sandwich’. The term sandwich is sometimes used due to the fact that the elements are layered in a stack, one on top of the other, like a sandwich. These instances are essentially the same as the first two with an additional element. The unique problems of shooting and compositing for these shots deem them have their own groups. The Third instance would be, in order from front to back, a *F-CGI-F Sandwich* (Illustration 4). The fourth instance of the *Elements group* is, in order from front to back, a *CGI-F-CGI Sandwich* (Illustration 5). The last instance of the *Elements Group* would be what could

be called the *Morph Element*. The term *morphing* was formerly a 2dimensional effect that “smoothly transitions between corresponding points of two different images, which has been apportioned to 3D CGI (Masson 1999, p. 118). It now can refer to the 3 dimensional interpolation from one shape to another (Illustration 6). In the case of the definition of a *Morph Element* would be the smooth transition between one 3D CGI element to another, two film elements combined, or the combination of 3D CGI elements and a film element. Many of the shots in *Terminator II* where the T1000 robots arms morphed into the hand, like when the mother’s arm turned from a blade back to her arm, could be considered a *Morph Element*. Out of these five basic instances in the *Elements group*, one could quickly give someone else the basic idea of the sequence in which the individual elements might be composited.

The second group of terms has to do with the level of reality the shot encompasses. This group seems to be the simplest, but gives the creators an idea of how much work or how much leeway the creators might have in the creation of the effect. The level of reality, or *Level of Reality* group, is composed of two simple instances, *Natural* or *Supernatural*. *Natural* instances of 3D CGI effects deal with trying to visually recreate an object or event that would occur in the natural world. This group would include instances of events such as rain, wind, tornadoes, light or objects such as vegetables, furniture, cars, buildings, animals or people. The goal of this group is to achieve the level of photo-realism, which would fool the audience into thinking it was a real object, or a real object in a situation in which a real film element would not be applicable. The second instance of the *Level of Reality* group would be *Supernatural* 3D CGI effects. This group would contain objects or events that lie out of the domain of natural

phenomena. There could be a fuzzy line between natural and supernatural due to the fact that you might have a natural element like a person in a supernatural phenomenon, like flying. The rule for where an effect lies in each of these groups would likely lie in the goal of the shot, does it need to have a high level of photo-realism, or is the goal to have a flashy otherworldly effect. If photo-realism is the goal, then it would probably fall under the heading of *Natural*, while if the otherworldly effect were the goal, it would probably fall under the *Supernatural*.

The third group of terms has to do with the kind of thing the visual effect is representing. This group, which could be called the *Kind Group*, can be broken up into three instances: an *Event*, a *Place/Thing*, or a *Character*. These instances seem to be self-explanatory, but like the *Level of Reality* group, these can give the creators an idea of what the focus is on the effect shot. Many special effects shots that are composited from the combination of CGI and film have to take into account all the elements of the shot, the characters, environment and phenomena that are taking place in that environment. By distinguishing the shot in these instances, the animators and compositors can have a clear idea of what it is that they have to concentrate on, even though there may be all three instances of these in the shot.

The first instance of the *Kind Group* would be the *Event*, is more concerned with a phenomenon that might take place, even though it might include the depiction of a place or a character. The *Event* might include such ideas such as a natural phenomenon like a tornado, explosion or meteor. It could also include something like a character, but instead of putting it in the character instance, it would be considered an event. Examples of this would be the character that exploded in *the Matrix* or a person who fell down the

bow of the ship in *Titanic* where the detail of the portrayal of the event is the important aspect. This may seem like splitting hairs, but by establishing a reason for placing the shots in these definitions, everyone working on the shot can have a clear idea of what needs to be emphasized. The second instance would be a *Place/Thing*, in which the environment or Object was the important aspect of the shots. The *Place/Thing* definition could encompass anything from a place like a building, house or room, to outer space, some supernatural area or an internal place like the inside of someone's head or other body part, or any object that would occupy any of those places. The third instance of the *Kind Group* would be *Character*. This instance could cover anything from animals, humans or insects to supernatural characters or inanimate objects that act as a character. The essential thing which differentiates an inanimate object as a *Character* from being a *Place/Thing*, would be the character like action it might take, like walking or moving on it's own. The *Kind Group* will conclude the exploration of groups of terms, which this study will explore.

There was previously mentioned a possible Fourth group which could be called the *Reason Group*, but for the sake of this discussion will only be mentioned briefly. The *Reason Group* could contain some of the terms like *Quicker*, *Better Looking*, *Less Expensive*, *Safer*, and *Easier*. Many of these issues would not be applicable to the lower end effects done by the average person. Their inclusion in a discussion would probably not have to come up in day-to-day production talks, rather the pre-production talks between the director and the special effects director, which is why they are just mentioned here. Add to these groups the descriptive terms that studios have come up with, and people have a structured system of terms to describe 3D CGI effect shots.

Studios will come up with many descriptive terms that add to the group of terms that are used to describe an effects shot. These terms are less familiar to the person who doesn't have access to the readings, which talk about these shots. Effects Post houses in the past were very secretive when talking about the construction of effects shot, much like magicians. They have brought the discussion out of the dark by opening the channels of discussion about these effects in books, magazines, and specials on the making of movie effects. Recently movie production studios like Warner Brothers have started doing online chats with the makers of the movies like the *Matrix*. This has let the descriptive terms, which lie out of the domain of the groups outlined in this discussion. These descriptive terms borrow words that might give a visual or mental representation of what the effect might look like, since it may not exist in the real world.

There were many new terms that the group at Sony Pictures Imageworks (SPI) that put together *Contact* came up with. The first time the main character Neil is shown is a long shot that pulls back from a close-up of her eye, which travels out the bedroom window up to the sky coming back to the control room when she is an adult. The director Robert Zemeckis insistence on using these lengthy shots in one continuous take led to the development of a new kind of effects transition, a big morph or the *Blorph*. The difference from blending and morphing they used this term for transitions that weren't exactly cuts or dissolves (Cinefex 71 1997, p. 122). Other examples of special descriptive terms developed in the production of 3D CGI special effects was also coined on *Contact*, it refers to the black hole scene in the spaceship. The conceptual look for the floor and the window of the spaceship was named *Podvision* by the effects team. It was a descriptive term developed for the wavering look of the pod, which was used in many 3D CGI shots

(Cinefex 71 1997, p. 133). The look that eventually developed for the look of the outside of the pod in the black hole was termed *Spaghettification*. This referred to the spindly-fingered look that gave the artists a visual metaphor for the visual look they came up with for the black hole (Cinefex 71 1997, p. 134). These are good examples of terms, which effective for use in the individual post houses, many times never leave them and may never be used again unless they get resurrected in some book eventually.

The film the *Matrix* on the other hand shows an example of terms that develop in the process of developing 3D CGI effects that leak out into the popular culture. They further developed on a process that had been used previously in commercials that had to that point been known as *Time Slicing*. This process, while still unique in the early cases since it was still experimental, was based on the process of shooting many frames of images with still cameras. The still cameras were timed by a computer to run at the same time or sequentially, to give the effect of a camera that can move faster than is possible in the real world. The images were then scanned in and edited with some enhancements to make the moves look smooth. The first popular instances of this took place in some commercials for the GAP in early 1997. If the instances used existing backgrounds, which limited the camera to a certain radial area, since the cameras would see each other. The special effects producers on the *Matrix* extended this technique by shooting the action on a green screen, and using a 3D CGI background, which could not be achieved if the real backgrounds were in there, since the still cameras would show. This technique came to be known as *Bullet-Time*. There are basically two instances of it's use, one where the character would be frozen in time, and the camera would track 180 degrees around it, or the instance where the camera and the character moves. This process employed many

techniques of photography and 3D CGI, not only in the final production with the use of the 3D CGI backgrounds, but they also used CGI in the pre-visualizations. This allowed the special effects crew to virtually orient the cameras and give them an idea of how fast the camera move would be in respect to the character. Although the basic process was not new, after the success of the *Matrix*, the term *Bullet-Time* became a buzz term that leaked into the popular culture via movie specials and the making of the *Matrix* they added onto the collector's edition. The advent of the DVD format with its extra space which studios are presenting outtakes and making of specials on the end allows for more terms leaking into the popular culture too. Another reason these terms are leaking into the popular culture may be due to the fact that more people are making low end movies because now people can afford to make movies with the these lower end and less expensive digital video cameras and 3D CGI software. There is also more dialogue regarding these movies due to the recent phenomenon of the popular Internet movie services like IFILM (<http://www.ifilm.com>) and Atom Films (<http://www.atomfilms.com/>). The *Matrix* is a good example of the direction that the development of new terms is developing and becoming more common. This will be a trend that will continue to evolve as the process of 3D CGI effects becomes more democratized and popular among the lower end projects being done by independent people and more studios.

CHAPTER III

SUMMARY AND CONCLUSION

This exploration tried to present a look at the small percentage of combined writing regarding the use of terminology regarding 3D CGI special effects for use in Film. It's intent was to take all this information, which was sporadically printed over many sources and present it into one unified source in order to give the reader a look at what has been talked about regarding this subject. By looking at the evolution similar film terminology into terms apportioned to the process specific to 3D CGI effects, trends began to form in the mind of this author, which led to the creation of groups of terms, which could be used in a matrix of definitions. This exploration took a look at the significant films in the realm of early to current films that employ 3D CGI special effects, in order to develop a working system of terms of which the reader could use to try to classify the effects in these movies as well as their own projects. The democratization of the tools and techniques of 3D CGI special effects for use in feature films as well as other media comes with the desire for people to learn how to do it. With this desire for knowledge, comes with it the notoriety and monetary incentive to drive these once secretive special effects groups to disclose this information to the masses. With this disclosure comes the inevitable need and development of a more codified system of terminology.

To answer the first question, which was asked in this exploration the three-group system, consists of the *Elements Group*, *Level of Reality Group*, and *Kind Group*, which seems in the authors mind to be comprehensive enough at this point to include all of the instances one might need to start talking about these shots. When pared with the

traditional terms for film it appears to give the person everything they need to give the whole group a start at defining the effects to understanding the general gist of the shot. Obviously by making these groups work together with each other in the matrix of terms, there can be room to add new groups or instances to these groups which may not have been thought of or necessary. To address the second question, there is no real way at this point to ensure that the groups of terms presented here will define the pathway that the development of that 3D CGI effects terminology will take. It would seem from the research reviewed in preparation that most of the effects read about could realistically be classified into each of the groups, and as far as the practical application, it seemed to work for the projects that were involved in the shots created in the physical exploration. When describing the shots to people, the concepts of the three group system were defined, and when further developments were explained, it seemed in the authors mind to help in the dissemination of the ideas to the people who may not have been as familiar with the processes. This was one of the goals of the whole creation of the three-group system, and it also helped keep things straight when creating the practical application demonstrations of these effects, by having a clear definition of what group these effects might fall into. It helped by finding connections to previous film effects, and therefore helped me pick which information about how to put these effects together to study in order to model the process of creating these effects. The third question in the proposal of this exploration was only explained in its simplest terms. While its explanations may have been simple, it was done with the goal of brevity due to the nature of the paper. The author believes that the overall the basic goal of adding enlightenment to the development of the terms and general understanding of the creation of 3D CGI effects

was achieved, even if it is only seen by a handful of people. A secondary goal was to possibly expand the exploration and develop a website or submit it to a 3D publication in order to bring the issues to the people who use this to see if it has any impact on the field in general. If nothing it added some understanding to the authors mind regarding a topic that was new to me, but which I wish to continue to research in hopes to learn the real process in order to be doing this in the field some day.

ILLUSTRATIONS

pod shots

| 1. Elements Group □ | 2. Level of Reality Group □ | 3. Kind Group □ | 4. Reason Group □ | A. Descriptive Terms |
|--|---|--|---|--|
| <ul style="list-style-type: none"> a. F-CGI □ b. CGI-F □ c. F-CGI-F □ □ d. CGI-F-CGI □ □ □ e. Morph Element □ □ □ | <ul style="list-style-type: none"> a. Natural □ b. Supernatural □ | <ul style="list-style-type: none"> a. Event □ b. Place/Thing □ c. Character □ | <ul style="list-style-type: none"> a. Quicker □ b. Better Looking c. Less Expensive d. Safer e. Easier | <ul style="list-style-type: none"> a. "Spaghettification" |

Illustration 1: *matrix of terms*



Illustration 2: *CGI-F*

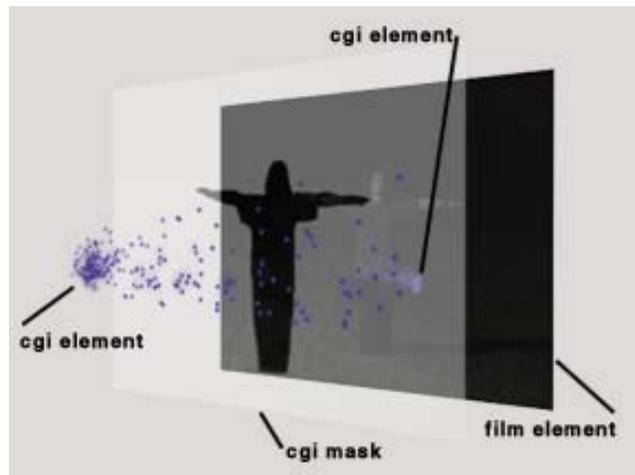


Illustration 3: *F-CGI*

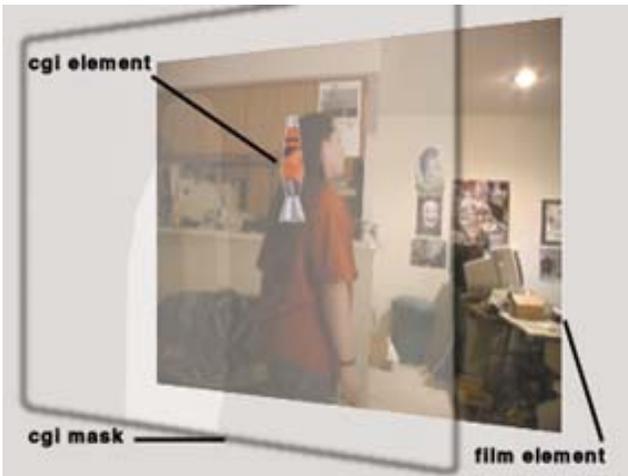


Illustration 4: *F-CGI-F Sandwich*

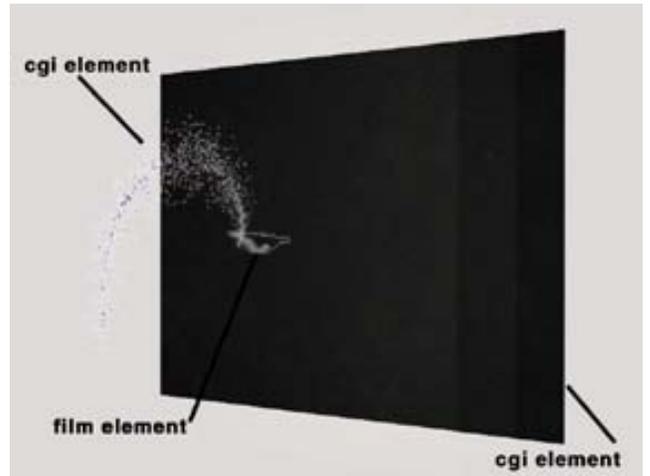


Illustration 5: *CGI-F-CGI Sandwich*

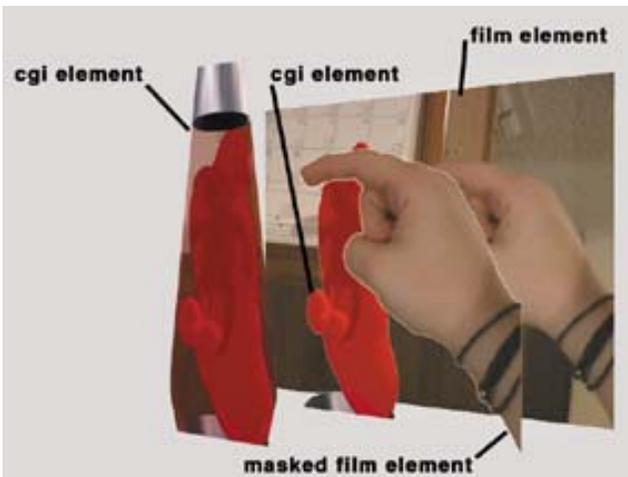


Illustration 6: *Morph Object*

REFERENCES

- “ ’20’ Questions.” *Cinefex* 71 (1997) 114-137.
- “Close Contact.” *Cinefex* 71 (1997) 114-137.
- Ascher, Steven, Edward Pincus. *The Filmmakers Handbook: A Comprehensive Guide for the Digital Age.* New York: The Penguin Group, 1999.
- Brinkman, Ron, *The Art and Science of Digital Compositing.* San Francisco: Morgan Kaufmann Publishers, 1999.
- Duncan, Jody. “The Beauty in the Beasts.” *Cinefex* 55 (1993): 42-95.
- Duncan, Jody. “Heart and Soul.” *Cinefex* 66 (1996): 44-65.
- Duncan, Jody. “A Once and Future War.” *Cinefex* 47 (1991): 4-59.
- Duncan, Jody. “Titanic Aftermath.” *Cinefex* 72 (1997) 82-98.
- Duncan, Jody, Kevin H. Martin, Mark Cotta Vaz. “Hero’s Journey.” *Cinefex* 78 (1999): 74-145.
- Luskin, Jonathan. “Riders on the Storm.” *Cinefex* 66 (1996): p 70-85.
- Duignan, Patricia Rose and Mark Cotta, *Industrial Light + Magic: Into the Digital Realm.* New York: Del Ray Books, 1996.
- Martin, Kevin H. “Jacking into the Matrix.” *Cinefex* 79 (1999): 66-89.
- Martin, Kevin H. “Deep Impact: The Angry Rock.” *Cinefex* 74 (1998): 13-22, 139-140.
- Masson, Terrence, *CG101: A Computer Graphics Industry Reference.* Indianapolis: New Riders Publishing, 1999.
- Shay, Don. “Back to Titanic.” *Cinefex* 72 (1997) 15-29.
- Shay, Don. “Ship of Dreams.” *Cinefex* 72 (1997) 30-81.
- Shay, Estelle. “Thouroughly Modern Mummy.” *Cinefex* 77 (1999) 100-119.