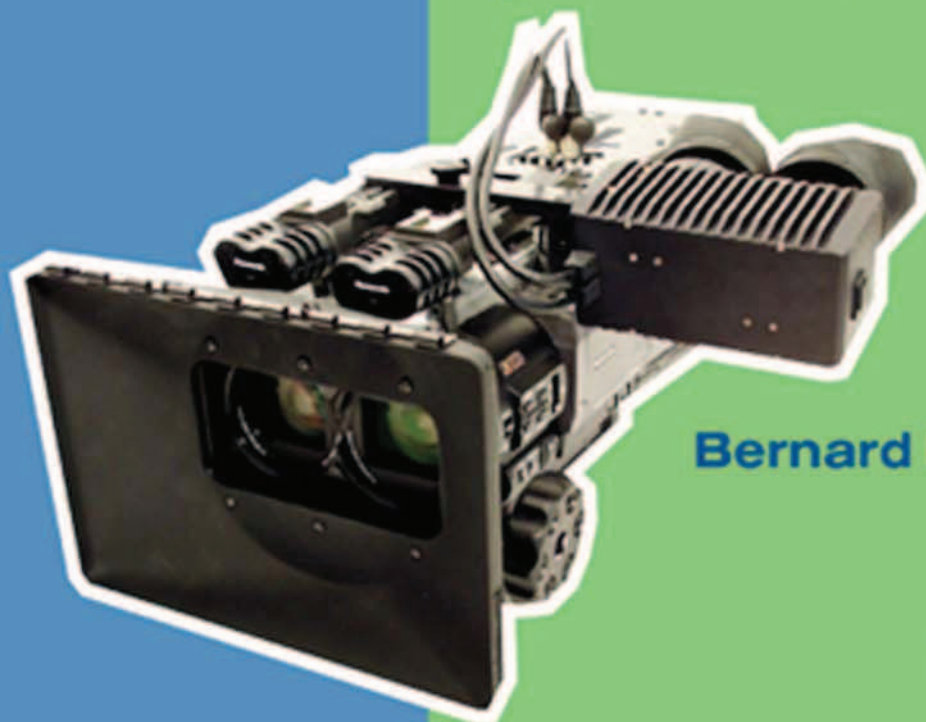


3D

Movie Making



**Stereoscopic Digital Cinema
from Script to Screen**



Bernard Mendiburu

**DVD
ROM
INCLUDED**



3D Movie Making

Stereoscopic Digital Cinema from Script to Screen

Bernard Mendiburu



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Preface

Stereoscopic Technography

Ray Zone

In 2007 I was struggling with an assortment of 3D postproduction formats working with various digital geniuses to finish my independent short stereoscopic movie "Slow Glass." The principle stereo cinematography had been completed in 2005 within a single week by Tom Koester and myself using a pair of JVC HD-10 digital cameras side-by-side on a bar. Now, almost two years later, the complex stereo blue screen compositing was slowly being finished. Terrific work had been completed by Brian Gardner, SFX supervisor Sean Isroelit, Tom Koester, co-producer and editor of the movie, and Bernard Mendiburu.

I had met Bernard in 2006 at the Stereoscopic Displays and Applications Conference held annually in San Jose, California. It was the centennial of the 1906 earthquake in San Francisco and Bernard had recently completed a wonderful short anaglyphic 3D documentary about the event combining historic stereoview card images and digital motion graphics. Subsequently I enlisted Bernard's expertise to create an opening title sequence for "Slow Glass" and he did not disappoint. Within a week, and working in his spare time, Bernard created an amazing sequence, laying animated mirror-like 3D titles into the live action stereoscopic background plates.

"Slow Glass" would not have been finished without Bernard. The final shot, with complex blue screen composites, had been proving baffling to my geniuses. We called it the "shot from hell." In this shot the actors walked across frame in front of a series of blue screen plates in the background and the 3D cameras panned with them as they moved. After the fact, I realized that all of the other blue screen shots in "Slow Glass" used a locked-down camera, except this final shot which came at the climax of the story. By shooting blue screen panels with panning cameras the complexity of the stereo comps had been logarithmically increased. It meant that every frame (or field) of the shot effectively became an individual special effect.

"I see why everybody called in sick on this shot," Bernard told me when he saw the problem he had to solve. But all Bernard needed was a deadline, which I promptly gave him. Two weeks later the shot was finished. It worked perfectly, seamlessly, as a special effects shot should, by not calling attention to itself. "Slow Glass" went on to win two awards at 3D film festivals and is very well received today.

Bernard continued with his work to make stereoscopic contributions to the Disney/Pixar movie "Meet the Robinsons," do 3D consultation with various

software companies and to write this book. Up to the present day, stereo cinema has been such an intermittent format in theatrical exhibition, reappearing every few years, that no technological standards, or even consistent terminology, has evolved. This book marks a watershed in stereo cinema. As digital imaging fuels stereography at every level of image capture, generation, manipulation and display, the need for a fundamental pedagogy and toolset is daily evident. Bernard Mendiburu has opened up the stereoscopic toolbox and explained for us what is inside it. He has created a very useful overview of some of the tools and applications that exist today for the creation of digital stereoscopic motion pictures along with a clear explication of basic principles. And he has done this just in time for the desktop digital 3D revolution.

The digital 3D tools will continue to evolve along with the rapidly changing skillsets for motion pictures in general. Stereoscopic technologists, building or writing digital images on the z-axis, have always had to refashion existing tools for a perennially “new” application. No readymade tools for stereography have ever existed. But that is about to change, along with a fundamental understanding of how motion pictures can tell stories in a visual space that is elaborated both behind and in front of the screen.

For the creation of a technical “primer” on stereoscopic production, postproduction and exhibition, the ideal candidate was enlisted. He is a technological problem solver with a specific stereographic vision. This book will enable other workers, stereographers of the future, to share in that deep vision and participate in its enlargement in the coming years.

Ray Zone is an award-winning stereographer, 3D film-producer and writer who has published or produced over 130 3D comic books. Zone is the author of “3D Filmmakers: Conversations with Creators of Stereoscopic Motion Pictures” (Scarecrow Press: 2005) and “Stereoscopic Cinema and the Origins of 3-D Film; 1838–1952” (University Press of Kentucky: 2007).

CHAPTER 1

Introduction to 3D Cinema

1

WHICH ONE OF THESE PICTURES IS IN 3D?

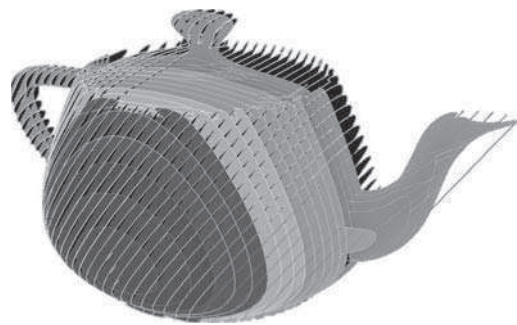


FIGURE 1.1

The Utah teapot is the emblematic 3D model, used over and over in CG research and development.



FIGURE 1.2

The action reaching out to the viewer is the signature representation of 3D displays. In reality such an effect is impossible, and the 3D action remains inside the frustum between the viewer and the screen.

The term “3D” in cinema refers to two concepts: computer-generated images (CGI or CG), which relies on 3D virtual models of objects like the famous Utah teapot; and stereoscopic (s3D) movies, in which the images, if seen through appropriate glasses, seem to reach out of the screen. These two 3Ds should be clearly distinguished, even if the current renaissance of 3D cinema was sparked by a dozen “3D animation” movies released “in 3D.” CG-3D has been intensively used in 2D medias like movies and video games for the last 15 years, and many “nonanimation” 3D movies are slated for release in next few years.

WHAT IS 3D CINEMA?

Chances are that you have recently seen a 3D movie in a theater near you. As you may know, 3D cinema is cinema where landscapes extend far beyond the screen and objects fly inside the room, thanks to 3D projectors and glasses. In the late 20th century, 3D has been falsely associated with cheap red-and-blue glasses. However, even in the 1950s, 3D used sunglass-like, neutral-gray filters that provided a full-color, highly comfortable viewing experience.

We enjoy that visual art, because 3D is the natural form of vision for predators. Stereoscopic 3D vision provides acute trajectory interception and impact point computation. Animals lower on the food chain tend to have wide-angle vision, to look for danger. This is why watching a 3D movie gives us a feeling of visual completeness that was lacking in 2D films, despite the tremendous efforts and skills of the cinematographers.

Eventually, 3D will make its way into mainstream cinema the way color and sound did: it will be considered useless until it's available with a reasonable price tag. And then, all of a sudden, it will be unavoidable and ubiquitous, to the point that the very mention of “3D” will disappear from posters. At some point in the near future, you will go to see a “flattie” for nostalgia's sake, just as you sometimes watch black-and-white movies on TV today.

Before we see this happening, 3D cinema faces challenges. First, how can it provide this feeling of additional depth to the audience via an industry that has gotten by without it for a century? Furthermore, experience in 3D movie making is so scarce that one can count world-class 3D directors on a single hand. The situation is the same regarding 3D directors of photography (DPs) and postproduction houses. On the other hand, 2D equipment and experience is widely available, and thousands of gifted cinematographers have beautifully mastered the tricks that let you forget that your current cinema experience is actually flat. Going into 3D production means leaving the well-known area of 2D movie making for the dangerous, mostly uncharted land of 3D.

We are in a transitional time. The creativity and freedom of directors, DPs, and editors will suffer some restraints until better 3-D production tools are crafted and the audience gets educated to this new cinematographic language. For

example long lenses flatten their subjects, camera rigs are bulky and complex, and caution needs to be used in 3D cuts. All this will settle down within a few years. In the meantime, we should remember that we are reentering a mostly unexplored world, crossing a frontier to an unmapped wild land where mistakes hurt, sometimes badly. This will be a challenge to an artistic industry in which the digital revolution and CG images have brought forgiveness to any possible mistake of shooting or creative megalomania. To some extent the whole profession is going back to school. However, we must remember that 3D has existed for as long as the cinema itself, and it has already seen a golden age and an extinction. The purpose of this book is to put together what we already know about 3D cinema and help you avoid known pitfalls while finding a path to your own 3D cinematographic style.

There will be no 3D cinema without these two elements: stories really benefiting from 3D and fully developed 3D cinematography. On one hand, this may not happen soon, just like not all movies have to be in color and people have enjoyed black-and-white movies for decades. Cinema has been flat for a century and economic realities could kill 3D once again. On the other hand, would you choose to watch a recent blockbuster on a smaller screen, or in plain stereo sound, if it would bring you a \$2 reduction on the ticket price?

WHAT DOES 3D ADD TO MOVIES?

This is not an easy question if we want to get an answer that goes beyond “depth, of course!” Cinematography is all about feeling, experience, and identification with characters—and 3D is mostly a technical trick. Can we put feelings into numbers? The entertainment industry does, and calls it box office. We will see their figures in the next chapter. For now, let’s focus on artistic and emotional dimensions.

Because 3D is our natural way of seeing, it brings a feeling of realism to the audience. With 3D, we no longer have to rebuild the volume of objects in the scene we are looking at, because we get them directly from our visual system. **By reducing the effort involved in the suspension of disbelief, we significantly increase the immersion experience.**

When it comes to close-ups, the effect is even stronger. The actor’s head fills the room, and this dramatically increases the emotional charge of the shot. If a person were as flat as a cardboard puppet, we would notice it immediately when we met him face-to-face. We naturally prefer the fine details of flesh structures, the volume and movement of underlying bones and muscles. The increased realism of human figures in 3D movies positively affects the identification and projection processes.

When it comes to landscape shots, the effect is a mixed bag. Because of optical laws, there’s a maximum size of what can be shown in a theater, and it’s not that much bigger than the screen itself. Until we have the movie projected directly

CHAPTER 2

Stereoscopic Vision and 3D Cinematography

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The purpose of this chapter is to introduce you to the human 3D perception. Our ability to combine the two images our brain receives from our eyes, to perceive depth, is called stereopsis. It's just one of many ways we understand the 3D world we're living in. We will see how stereopsis works and relates to other 3D perception tools, how it may sometimes not work properly, and, eventually, how it affects 3D moviemaking. The final experiment will give you a chance to voluntarily control your stereoscopic reflexes.

STEREOSCOPIC DEPTH PERCEPTION

Understanding the layout of our surrounding world is key to keeping us comfortably on top of the food chain. How far away is that lion, looking at me? Is this rock really flying toward my head? Can I jump from here to there? Neurologists tell us we answer these questions using an internal representation of the world that our visual cortex builds by using visual depth cues. We will see that monoscopic depth cues can be extracted from a single view, sometimes using some sort of time shift, although stereoscopic cues are built on the comparison between the two eyes' points of view.

Monoscopic depth cues

It is likely that you know people with one blind eye, but they've overcome their handicap to the point you'd never notice it. They do not bump into chairs, they do not drop glasses over the table edge. How is that?

It's because we can extract a lot of 3D information from a single 2D view. Just consider that distant objects are smaller and partially hidden by closer objects, and you'll get the gist of it. Let's have a closer look at these cues. Let's start with monoscopic cues, for they are part of cinema for a century, and we give them preeminence when we watch a movie.

PERSPECTIVE AND RELATIVE SIZE

If you see a picture of a man and a skyscraper, and they both look the same size in the frame, you can safely assume that the building is farther away.

As we have just seen, perception of volume in our surrounding world depends on many visual cues, most of them monoscopic, some of them stereoscopic. And the stereoscopic accuracy decreases with distance, to a point where it's useless, somewhere around the 150-yard mark.

When making your 3D movies, you'll have to take into consideration all these new factors. What you will make of it is not yet known, and that's where your artistic creativity will have to express itself—that's where the audience is waiting to be surprised and entertained.

The 3D comfort zone and palette limitation

We have established that the 3D space you'll be able to use in the theater is limited and you may consider that it comes with a rather obscure user manual. Recent cinematography evolution leaned toward media range freedom, with ever more sound channels and pressure levels, high dynamic range imagery, and virtually unlimited camera movements. Opposite these liberties, the stereoscopic 3D space is more like a pyramidal box, less than 200 feet deep, and touching its walls can hurt like hell. Not only do we have to squeeze the world inside this box, we can't even use its full range at once due to fusion limitation.

New 3D cinematographic tools

In order to overcome the classic limitations of 3D imagery, new tools are being created, or old tricks are being brought to fruition, thanks to the complete digitization of the production pipeline. You will be introduced later to the concepts of depth budget, depth bracket, floating stereoscopic window, multiple rigs, depth warping and depth grading. They all relate to technical ways to artistically fit a story universe inside a screen volume.

STEREOSCOPIC VISION EXPERIMENTS

Exercising your stereoscopic vision

If you want to experience the limit of your stereoscopic vision you can try this simple set of three visual experiments.

Exercise

Maximum distance for stereoscopic discernment

First, go outside and look at objects in the landscape, in the mid-distance range, like a tree and the house next door. You should be able to see stereoscopically which one is in front of the other. Search for the ability to see the depth gap between the objects, at the edge of the

overlapping one. Now, select pairs of objects farther away. At some point, you'll be unable to see that depth gap. This is your maximum stereoscopic discernment distance.

CHAPTER 3

Learning 3D Cinematography

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There's a popular belief that a 3D movie is just a movie shot with two cameras. This would be true if making a 2D movie were just shooting it with a single camera. And what distinguishes a feature movie from a birthday party video is precisely not the camera, but all the work done before, during, and after the production on location. People who talk about two cameras are either ignorant of the moviemaking craft, or are insulting both 2D and 3D cinematography by reducing them to technical gestures when they are long and collaborative creative processes. Refusing to acknowledge the high complexity of 3D cinematography never made it simpler—it just made bad movies.

In this chapter we will see that 3D cinematography knowledge is an elusive and treacherous concept, the real thing being experience. We'll focus on the interference of existing 2D experience, and the best way to fast-track your own acquisition of stereoscopic-imaging experience. We will then examine why the deployment of sound and color technologies offers very good analogies, helping us to cope with the current 3D evolution.

KNOWLEDGE IN 3D CINEMATOGRAPHY

Phil McNally, alias "Captain 3D" and a global stereoscopic supervisor at PDI, teaches stereoscopic 3D to hundreds of artists who have already mastered animation 3D. After many years of producing 3D movies, he is often quoted as saying: "One can teach the whole theory of stereoscopy in two hours. You can learn all about 3D moviemaking in two months. That will never give you the 10 years of experience needed to master it. Good movies are made with experience, not with knowledge."

Another very experienced stereographer, Kommer Kleijn, says: "A good cinematographer can study 3D, and in two weeks, he'll know how to avoid mistakes that hurt the audience, and make 3D work nicely. Nonetheless, he would use the 3D just as a technique, not as a full-fledged and compelling storytelling tool. He would produce a 3D-converted movie, not a 3D-intended movie. That would take him years to master."

Let's see how this impacts the crews starting a 3D project.

CHAPTER 4

Tools of the Trade

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Chapters 5 to 10 will study, step by step, the impact 3D has on moviemaking. Before we study the details let's have a look at the big picture. To effectively learn 3D moviemaking, you will want to go back to the basics of motion pictures, and revisit them with a 3D eye.

Cinematography is all about catching light on film and reproducing it on a screen. Stereography is all about doing it twice and get these two pictures perfectly replicated on a single screen. In a nutshell, you'll make two pictures, with perfect control of both cameras' parameters and relative positions. You'll then display those two pictures using some sort of 3D display or technology.

In the analog age, this was an extremely complex task and very few directors and DPs actually mastered it. Lens imperfections and mechanical devices' natural tendency to drift in space and time collided with stereoscopic image requirements. Digital production and postproduction provides us with the ability to control and groom the disparities to perfection.

At this point in your progress into 3D cinematography, you need to get some sort of 3D computer and 3D still camera. As you will discover, the computer can be anything from a low-end laptop you would use with anaglyph glasses to a high-end workstation with a real 3D display. As for the camera, solutions range from 10 bucks' worth of disposable film cameras up to a grand spent on a pair of high-end digital SLRs.

3D PHOTOGRAPHY

At last, shooting your first 3D picture may be a few minutes away—if you want it to be. Here's how.

1. Get your digital still camera.
2. Select a scene with no moving objects, such as the room where you are.
3. Take any picture, but avoid having an object closer than 3 feet or 1 meter.
4. Keep looking through the viewfinder.
5. Shift your head one or two inches to the right.

6. Take a second picture, trying to replicate the first one as closely as possible.
7. Congratulations, you are done!

If you can't help it, jump to your computer, do the workshop at the end of this chapter and make your picture pop in 3D.

This dual-take procedure is barely usable in movie production, other than stop-motion animation. In 2009 the studio Laika released the feature movie *Coraline*, which was shot with this procedure, using motion-controlled cameras. Any other 3D movie will need the two pictures to be shot at once, in perfect synchronization. You need two cameras to do that.

3D camera requirements

MATCHING CAMERAS

Producing two identical pictures starts with using two identical cameras. Your twin cameras will have to be exactly the same, for complete interchangeability. Considering that the manufacturing process, component outsourcing, and software microcode may change over the production of a given model, you'll want to get cameras that were produced the same year, if not the same day. If you can get them with consecutive serial numbers, you can hardly get better. If you are renting the equipment, make sure your provider knows about this requirement. A good way to make it clear how much you want the cameras to match is to ask for assurance that both cameras run the same software version and that all presets are reset to factory defaults. If you are using preset cards, make sure they carry the same ring of settings.

Then you will want the cameras to get the very same picture, using the very same settings, doing the very same image processing.



FIGURE 4.1
Coupled digital still cameras.

CHAPTER 5

3D Cinematography Fundamentals

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Setting 3D for a movie is all about adequately squeezing the real world inside the 3D screen space. That screen space is created by the interaction of the 2D screen and our eyes, and can be somewhat transformed using very specific visual effects.

HOW THE CAMERA SETUP CONTROLS THE 3D EFFECT

Interocular distance

The distance between the cameras is the single most important parameter in stereoscopy. It will regulate the strength of the 3D effect. Pull the cameras apart and your subject will grow. Push the cameras together and it will shrink. Setting this value is an artistic and technical decision linked to lens choice, desired 3D effect, and the eventual release format of the movie. It is because of this setting that you will have to remember the two most important rules of 3D moviemaking. Let's repeat them once again; it can never be too much. First, you won't trust your 2D-based experience. Second, you want to visually control your 3D, if possible on a full-size 3D display.

Later in this book we will learn to calculate the maximum and minimum on-screen parallaxes, and the interocular (i.o.) distances, as a function of the lenses and set metrics. In the meantime, you can use the 3 percent rule, which provides us with a rough estimate of the appropriate i.o. Experience will teach you how to increase this value when the background is close to the foreground, and how to decrease it for large screens or long lenses.

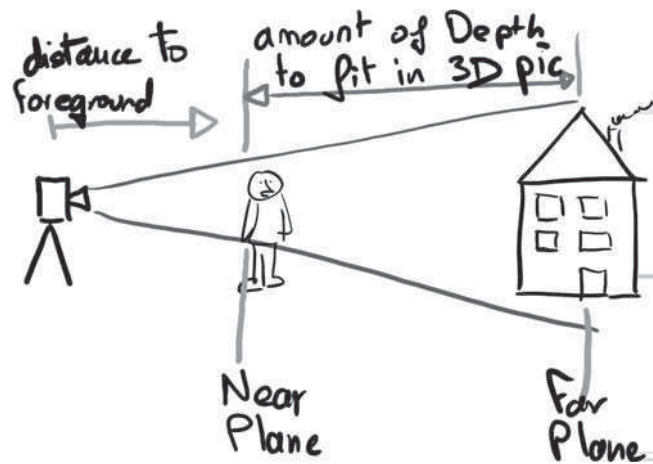


FIGURE 5.1
The interocular distance.

CHAPTER 7

Principal Photography

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Principal photography is the harder task of stereo cinematography, and this subject could fill up a whole book by itself. The point is, if you get it wrong at the camera stage, all the following steps will turn into a nightmare. Furthermore, the usual damage control tools that work in 2D to correct damaged footage will not work in 3D or will require tremendous additional manpower to look nice. Perfect stereo photography is not an easy task, and we'll see how you can approach it and, eventually, reach it.



FIGURE 7.1
Digital 3D cinema camera.
Image courtesy of Binocle.

This chapter has three sections: A short introduction is followed by an overview of the theory of 3D principal photography. Then you'll be introduced to methods to set up your 3D camera.

CHAPTER 8

CGI and VFX

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Stereographers who used to work with classical cameras and projectors state that the film-based 3D production and exhibition could be flawless if properly handled. According to them, stereoscopic digital postproduction is the only root cause of the 3D renaissance, leveraging CGI animation, 2D/3D conversion, and in-depth compositing.

And they may be right, because digital stereoscopic postproduction, through post prepping, is the magic Pandora's box that makes perfect 3D a reachable goal to most crews, not just the few geniuses who do not make a single mistake in a whole movie production cycle.

Before you jump into that land of milk and honey, listen to the experts in the field:

"Stereoscopic visual effect? It's twice the amount of work for half the money."

—3D VFX guru **Tim Sassoon**

This chapter benefited from the advice of Rob Engle, VFX supervisor and senior stereographer with Sony Pictures Imageworks, Tim Sassoon, CEO of Sassoon Film Design, and Kommer Kleijn, stereographer of *Haunted Castle* and *Devil's Mine—The Return*. We would like to thank them for sharing with us their tremendous knowledge on the subject.

MAKING 3D IN 3D: STEREOSCOPIC COMPUTER-GENERATED IMAGES

Following the release of *Toy Story*, we have seen a massive shift from hand-drawn pictures to 3D modeling and rendering techniques in animation studios. In a 3D animation movie, all the scenes and actors are already computer

CHAPTER 9

Editing

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3D editing is the fastest-changing subject in the stereoscopic field. The debate is fierce among directors about the specificities of editing for 3D. It's a hot topic because it's deeply linked with the debate on convergence and the control you have on the audience's sight. We will see how the 3D edit style and pace is a continuation of the 3D photographic style.

While waiting for the market to come up with edit stations designed for 3D movies, you have to edit movies with the current generation of 2D tools. A range of existing makeshift solutions make that possible.

Eventually we will have a look at the effect of 3D images on sound mixes, even if this is a barely explored subject.

THE THEORY OF 3D MOVIE EDITING

Is cutting 3D different from cutting 2D?

The big question about editing 3D is quite simple: Do you cut 3D just like 2D? There has been a long-lasting consensus that 3D should be cut its own way. *Which* way was not really defined beyond being at a slower pace than 2D, considering that 3D images are more complex to process visually. Not only is 3D reading time longer, but the audience tends to scan the whole scene before going back to the subject. The detractors of such an approach believe that the technique should not influence the art, that it's the DP's job to make images that match the script's intended rhythm, and that converged stereo with shallow focus reads just as fast as 2D. We see here that this debate on editing style was most likely decided one way or the other when the picture was shot. You will either adapt the edit to the depth or adapt the depth to the edit.

We would like to emphasize that the debate is still very open, and most of the debaters have made mostly short, large-format 3D movies, with either scientific or amusement purposes. You can hardly debate drama edit conventions based on theme-park rides or documentaries about the octopus's life. Since the 1950s golden age of 3D, the edit culture has shifted from classical settings to the so-called

CHAPTER 10

Grading and Packaging

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Now that your movie is ready for release, here comes the last grooming step before it meets its audience. This chapter will cover

1. the subtleties of color grading for 3D
2. the new concept of depth grading
3. the various packaging and releases options for
 - cinemas and special venues
 - optical disks and home cinema

This chapter was greatly enhanced and expanded with the help of Jeff Olm, freelance stereo colorist, who is arguably the most experienced color artist in 3D. His credits include *Journey to the Center of the Earth*, *Monsters vs. Aliens*, and *My Bloody Valentine*. He is a RED stereo workflow consultant, too. We would like to thank him for sharing with us his tremendous knowledge on the subject. The section on Stereoscopic Floating Windows is based on Brian Gardner's work. More details on his contributions to 3D storytelling can be found in his white paper included in the DVD.

COLOR GRADING FOR 3D

The color grading of a 3D movie is quite a complex operation because the various display technologies have different light efficiencies and color shifts. Some recent 3D releases have included up to 14 different digital packages for a single title. The situation is expected to be settled in the future, with the pressing request from the studios to have only one 3D master for all systems. In the meantime, it's the color artist's duty to adapt the color look of the movie to the many distribution channels it will use.

Appendix 1 Cinematography Equipment

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THE 3D PHOTOGRAPHY EQUIPMENT

The bare minimum to shoot 3D is a 3D camera and a 3D monitor. For productivity improvements, you will want to use a 3D-capable disk-based recorder and for depth quality insurance you will set up a makeshift 3D theater close by. 3D cinematography requires images matching on photography and geometry. This is provided on set by specially engineered cameras. Some of them have adjustable interaxial distance, when others have fixed interocular.

3D camera with adjustable interaxial: The rigs

Modern 3D rigs are apparatuses that hold the cameras together and allow for dynamic lateral shift, sometimes with convergence adjustment. Such rigs may include a mirror. Keeping all the parts tightly aligned is no easy task. It takes years of experience and a whole machine shop to create a fully functional one. Rig makers may be by the dozens around the world, but only a handful of companies have mastered the craft to the point that their products can be used on feature productions. Most of their systems are one-of-a-kind, with rare exceptions of rigs intended for rental or resale. For each type of rig presented here, you will be introduced to its pros and cons, as well as the name of company that makes it. Some advice is given on how to build rigs, but in most cases this subject is far beyond the scope of this book.

THE PARALLEL RIG

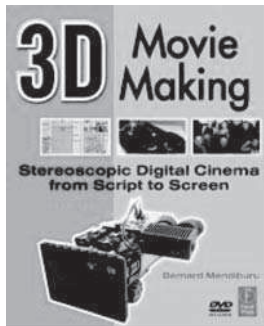
The parallel rig is the simplest of all 3D rigs, and you can make a rudimentary one in a few minutes as explained here.

FIGURE A.1
A parallel rig with cameras mounted side by side.



Files Included on the DVD

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MOVIES

This section of the DVD contains examples of 3D movies. You will find them in various formats, including anaglyph, anamorphic, side-by-side, and dual stream with sound. You can watch the anaglyph movies directly in your computer, including Apple and Linux systems, but you will need a 3D player to enjoy the other formats. I do recommend Peter Wimmer's "Stereoscopic Player" and you'll find a demo version in the software section of the DVD.

Santiago Caicedo, AMAK, and ENSAD: "Moving still"

"Moving Still" is a very good example of mixing live action 3D and CGI. Furthermore, it shows how very good 3D can be produced with a single camera, using the Pulfrich effect. It won the "best first presentation" movie award at the 2008 NSA convention. "Moving Still" is ©2007 by Santiago Caicedo, Amak, and Ensad.

Eric Deren: Demo reel and experiments

The Eric Deren demo reel and experiments shows the use of 3D in extreme situations like skydiving or super slow motion. The demo reel shows the effectiveness of CGI 3D and transparency.

Phil McNally: "Pump-Action"

"Pump-Action" is the movie that brought Captain 3D to Hollywood, where he is now Studio Global Stereoscopic Supervisor with DreamWorks. This CGI short won many awards around the world in various 3D competitions.

Ray Zone and Ron Labbe: “A Better Mousetrap”

This short movie, produced by Ray Zone and directed by Ron Labbe, was originally rendered and presented in IMAX3D format. The massive size of the screen allowed Zone and Labbe to put the scene in front of the screen, and this has to be adapted for Digital Cinema. In the same folder you will find an After Effects project that resets the action behind the stereoscopic window. If you are using the movie in a workshop, you can make the same adjustment using floating windows exclusively.

Celine Tricart: “Reminiscence”

The French cinematographic studies school Louis Lumiere started a 3D teaching and research program in 2005. Three years later, the class of 2008 was producing its first 3D movies as part of their graduation requirement. “Reminiscence” tells an unconventional story of intergenerational connection through imaging technologies.

AFTER EFFECTS PROJECT FILES

In this section of the DVD you will find full project folders of real 3D movies to explore, modify, and play with.

Slow glass – shot of hell

This is an example of why you should always avoid rotoscoping in 3D. The blue screen is impossible to set up due to overlapping white and blue props and HDV compression artifacts.

The original project file used stereoscopic movies as inserts, making the total project more than 17GB. The movies have been replaced by still pictures in this distribution version in order to fit on this DVD.

Slow glass – title sequence

This is an example of a pair of cameras being used in a simulated 3-dimensional composition world in After Effects. The left and right plates are used as backdrops for, respectively, the left and right cameras. The interocular distance is set to have the correct “depth progression” of the synthetic 3D elements when they move toward the cameras. Once the camera interocular is set up to a roughly correct value, a simple 3D animation of the title places it in depth.

THE NOGLASS FOLDER

This is the composition with no glass effect, created to set up the 3D space and masks. It has eventually been duplicated into the Stereo_Glass folder to inject the glass effect into the 3D setup. Title Left and Title Right are duplicates; only the camera Y position is different.

THE STEREO_GLASS FOLDER

This is the master composition with *Left* and *Right* for final rendering, and *Stereo* used for real-time 3D viewing and rendering dailies sent to the director.

THE STEREOGLASS_L AND _R

StereoGlass_L is the original flat project in which the effects were set up and fine-tuned in 2D. It has then been duplicated in two compositions with only two differences:

- [1] The camera Y position
- [2] The source footage in backdrop

SOFTWARE AND TUTORIALS

Louis Marcoux tutorial on stereoscopy in 3Ds Max

Learn how to use 3D Studio Max, a 3D movie-making tool with anaglyph preview and a 3D camera. These movies are provided courtesy of Louis Marcoux.

<http://louismarcoux.com/MaxTips.htm>

You will find more tutorials on his Autodesk space :

http://area.autodesk.com/index.php/tutorials/tutorial_index/stereoscopy_tutorial/

Bas-Relief demo

Bas-Relief is a depth-map creation tool used to create 3D conversions of 2D pictures. It is included on the DVD courtesy of Evgenia Wassenmiller.

Inition Stereo Brain demo

Stereo Brain is a computing tool used to set the optimal interocular for your 3D scenes. If you want to continue using it after 15 days, you'll have to buy a license from www.inition.co.uk.

Peter Wimmer stereoscopic player and other tools

Peter Wimmer's tools are at the top of must-have 3D tools lists. The most useful are the 3D player and 3D multiplexer.

The player can ingest any 3D recording format and re-encode it on the fly into any 3D display format. You will need the player for most of the full-color and full-resolution 3D movies available on this disk.

The multiplexer can ingest two video sources, like two digital cameras or two webcams, and mix them on the fly into a single side-by-side video stream.

The multiplexer and player can be used together to build a low-cost live 3D monitoring system. You can even feed an Internet video stream with the multiplexer and play it in 3D with the player.

The demo version of the player is limited to 5 minutes.

STILL PICTURES

2D pictures and 3D software screenshots

This folder hosts 2D pictures of 3D equipment or the making of 3D movies. Images appear courtesy of Binocle, 21st Century 3D, Florian Maier, Ray 3D Zone, and Gemini.

The screenshots present the various 3D tools available as of early 2009. You will find images from Autodesk, EON, The Foundry, Quantel, IRIDAS, and more.

3D pictures

This folder hosts images from many 3D artists who agreed to contribute to this DVD. You will find autostereoscopic images, color-encoded images in various formats, 3D conversion examples, and various 3D formats.

3Dimka images are examples of “autostereograms” that you can see without special glasses. 3dimka.deviantart.com.

Celine Tricart, the director of “Reminiscence,” shares some plates from the movie and making-of pictures. www.celine-tricart.com.

ChromaDepth is an encoding format where the warmer colors are closer to the viewer and colder colors are pushed behind the printed image. You need special glasses to see them, which you can get at www.3dglASSESonline.com.

ColorCode 3D is another color-encoding system. This patented variant of the anaglyph uses blue and light amber gels. It was massively used in February 2009 for 3D commercials during the Super Bowl, and in subsequent 3D shows. www.colorcode3d.com.

Enrique Criado is a famous 3D stereographer known for the quality of his talks. These images are extracts from a presentation he gave to the 2008 Stereoscopic Displays & Applications Conference, where he shared the “best use of 3D” award with Rob Engle. www.enxebre.es.

Evgenia Wassenmiller is a Russian 3D artist who does 3D conversions. She shares with us a few examples of recreated depth maps and the resultant 3D images she created with her tool “Bas-Relief”. www.3dmix.com.

The images from **Philips** are examples of 2D + Depth and 2D + Depth + Occlusions that are used in autostereoscopic imaging systems. The 3D player embedded in Philips WOWvx displays recreates up to 46 views from this special 3D format. www.wowvx.com.

Vic Love is a 3D photographic artist whose online gallery can be found at www.MY3DCAM.com.

WHITE PAPERS

This section regroups papers published by various companies and personalities working in the 3D field. They will give you an insight into their respective approaches to 3D. The contributors to this section are Autodesk, Florian Maier,

In-Three, Michael Starks, Peter Wimmer, Quantel, Ray Zone, Brian Gardner, Sensio, and The Foundry.

ONLINE

The world of 3D imaging is an ever-changing one and the Internet is the only place where the information is up-to-date. I invite you to get to this book's homepage at www.digitalstereographer.com.

The Links section will lead you to the most useful 3D web sites, including StereoPhoto Maker, Make3D, Stereoscopic Computer, and LumaChroma.

You will find many 3D pictures and movies at the following addresses:

<http://www.stereomaker.net/sample/index.html>

<http://www.stereomaker.net/sample/stph02.htm>

<http://www.stereomaker.net/sample/index.html>

http://3dtv.at/Movies/Index_en.aspx

For more information, for detailed help, or to engage in discussions about 3D movie-making art and technology, you'll find dedicated fans of 3D movie making on the Yahoo group "3dtv" <http://movies.groups.yahoo.com/group/3dtv/> and on the Stereo3D forum <http://www.stereo3d.com/discus>.