Adventures in Stereo:
Stereoscopic Cinema in the Age of a Digital Observer

By

Sean Arden

BMA, Emily Carr University, 2012

A THESIS ESSAY SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF

MASTER OF APPLIED ARTS in Media Arts

EMILY CARR UNIVERSITY OF ART + DESIGN

2012

ABSTRACT

This paper represents an historical and cultural context for the research and studio work achieved during the 2 year MAA in Media Arts at ECUAD. The studio component is an exploratory engagement within emerging processes of digital stereoscopic production and alternative uses of new and available tools. The ultimate goal of the research is focused on a process discovering how to work within the stereo space, developing tools for cinematic applications and collecting this knowledge into an arsenal of stereo communication techniques outside of the methods dictated by a dominantly orthostereoscopic understanding of 3D imagery. In order to position the tools, possibilities and subsequent impact of stereoscopic media within current Western culture, the paper reflects upon Jonathan Crary's concept of the observer and Giorgio Agamben's apparatus. The apparatus and the observer are concepts that aid in understanding stereo media's place in history and its re-emergence in the digital present. The studio research project manifests in a stereo film/installation hybrid, which exemplifies the ideas and links between the apparatus and observer. Included in the thesis are descriptions of key influential artists and filmmakers, such as Phillippe Baylaucq, Michael Snow, Wim Wenders, Janet Cardiff and James Turrell. These descriptions are paired with insight into the production and aesthetic qualities of the thesis project to help the reader better understand the scope of applied knowledge gained through the research project, as well as the creative impetus behind it. Alongside the contemporary examples and influences is an historical account of the Spottiswoode Brothers and the pivotal Telecinema festival. The historical account demonstrates how this thesis project and current stereo practitioners are still working to create a stereo language for dimensional films.

TABLE OF CONTENTS

LIST OF FIGURES

ACKNOWLEDGEMENTS

I would like to acknowledge the support of the faculty, staff and general community of

the Emily Carr University of Art and Design for their encouragement during my time as

a student at the institute. I am indebted to Dr. Maria Lantin, Dr. Randy Lee Cutler and

Julie Andreyev for their guidance, direction and support. I would also like to acknowledge

Fiona Bowie, Michael Boyce, Myron Campbell, Marty Brenneis, Ian Rhodes, Alan

Goldman, Sandra Dametto, Onwyn Auria Stacey, Shannon McKinnon, Phillip Robbins,

Krisdy Shindler, TopLessGayLoveTeknoParty, Karolle Wall, Kris Fortune, Adrian

Buitenhuis, Rick Overington, Chris Ferguson, Alexandra Samuel, Dale Gamble, Leanne

Rooney, Greg Boa, Angeles Correa, Petra Watson and my fellow 2012 cohort of MAA

students. I list these people because I could not have accomplished this without them.

To my Mom.

Introduction

This paper is an overview of the relevant historical and cultural references used while engaged in studio-based research at Emily Carr University of Art + Design towards a Masters of Applied Arts (MAA) in Media Arts. The purpose of this document is to describe the critical context of my practice. Structurally, there are three main sections: Historical Overview, Theoretical Context, and Contemporary Situation.

The historical overview begins with the emergence of stereoscopic film (henceforth referred to simply as stereo), post WWII, highlighting major films, technical advancements, technicians and events. The outlined trajectory of the research is significantly influenced by the period of the 1950s, which bears a likeness to the current popular interest in stereo films, as well as to the techniques of stereo production, and of course, revenue concerns. These similarities bear upon specific areas relating to the MAA studio research. The comparison is largely economical in relation to the current access to cameras and other equipment, and also practical when discussing the processes that artists embark upon when first learning about stereo.

The theoretical context offers an interpretation of two intertwined concepts: Jonathan Crary's central idea of the observer in *Techniques of the Observer (1991)*; and the subject created by an apparatus, as discussed in Giorgio Agamben's *What is an Apparatus? (2009)*. The discussion of Crary's observer and Agamben's subject, or process of subjectification, creates a framework to consider nontraditional uses of stereoscopic media within our contemporary mass media culture.

Last, this paper presents an overview of several contemporary artists and filmmakers whose work offers a dialogue with and a context for the stereo and video experiments emerging from my studio practice.

Fig. 1

It is within these three areas of focus that my practice finds critical historical dialogue and contemporary methodological relevance. Included at the end of the thesis are three appendices and a glossary. The glossary defines some of the terms used in the body of the text that might not be familiar to the reader. The appendices detail three main projects of studio research taking place during my study period. Appendix 1: 3D Camera Projects, gives a description of several experiments undertaken to learn how to shoot video in 3D. Appendix 2: Whizard Projects, details three different projects that move and place the camera using some type of homemade rig or mechanism, and the final Appendix is a treatment with selected storyboards of a short experimental film currently in production.
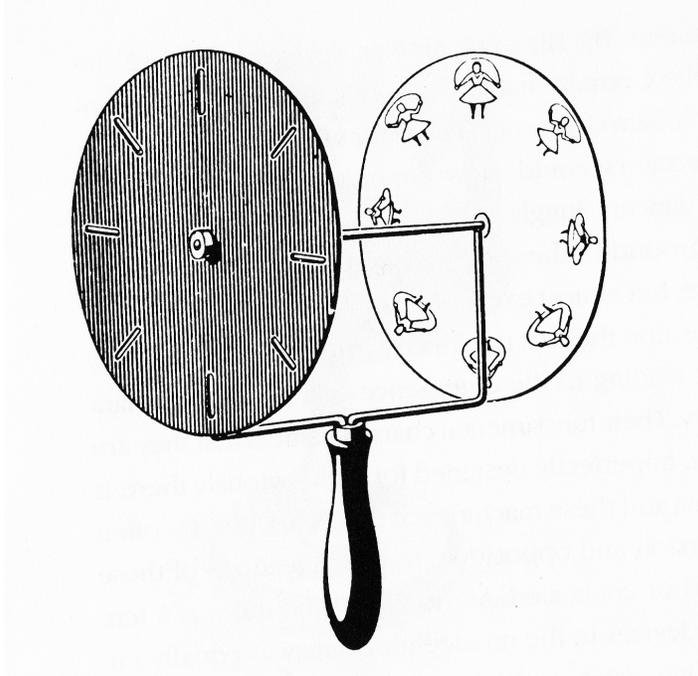
Historical Overview

Important to the context of the thesis work is how stereo 3D was at first widely introduced to the mainstream. Many of the reasons that stereo films rose in popularity during the 1950s resonate with today's global re-emergence of 3D. Stereoscopic film and photography have been

Fig. 2

around since the inception of the camera and film. The principles of stereopsis existed well before the first photo or film reel, as evidenced by the stereoscope[1] and phenakistoscope.[2] Yet cinemas projecting 3D films were not available until after 1953. Before this time, stereo imagery could only be found at world fairs and technology exhibitions.[3]

Engineers and camera people interested in the principles of stereoscopic film developed

---

[1] Holmes Stereo Viewer. Source: http://en.wikipedia.org/wiki/File:Holmes_stereoscope.jpg. Visited on March 4, 2012.

[2] Phenakistoscope. Source: Jonathan Crary, Techniques of the Observer. On Vision and Modernity in the Nineteenth Century. (Cambridge: MIT Press, 1990), 109.

[3] RM Hayes, *3D Movies: A History and Filmography of Stereoscopic Cinema.* (Jefferson, North Carolina : McFarland and Co. Inc. 1989), 23.

Fig. 3

the processes that led to the 3D boom in the 1950s. Stereo imagery has developed consistently alongside 2D photography and film, and is carried forward by 3D enthusiasts and camera engineers fascinated by the principles of stereo.

A significant event in the emergence of stereo was the Telecinema festival in 1951, which featured full colour stereoscopic projection and stereophonic sound.[4] Raymond and Nigel Spottiswoode and Lesley P. Dudley were the camera engineers hired to produce the equipment and content for the festival. It was after this festival that the two Spottiswoode brothers started Stereo Techniques Ltd., where they produced 18 shorts in collaboration with others. This was a catalyst for the boom in stereo cinema in 1953 and 1954.[5] Their original design was to be the basis of all future dual camera systems built by the major studios in the US, but they received little to no recognition.[6]

It seems there is also a distinct Canadian link throughout the history of stereo filmmaking. According to an ambiguous caption on a photo from the Spottiswoode family

---

[4] Ibid, 15.

[5] Ibid, 15.

[6] Ibid, 14.

archive, "the beginning of 3D" took place in Ottawa, Canada in 1945.[7] Raymond

Spottiswoode was heavily involved with the National Film Board (NFB) during WWII,

creating propaganda films. Another noteworthy filmmaker commissioned to make films

for this exhibition was Norman McLaren, who created the animated stereo film *Now is*

the Time (1952).

In the United States, a cinetechnician named Friend Baker developed a system using

two16mm cameras to record and project some of his amateur travelogue stereo
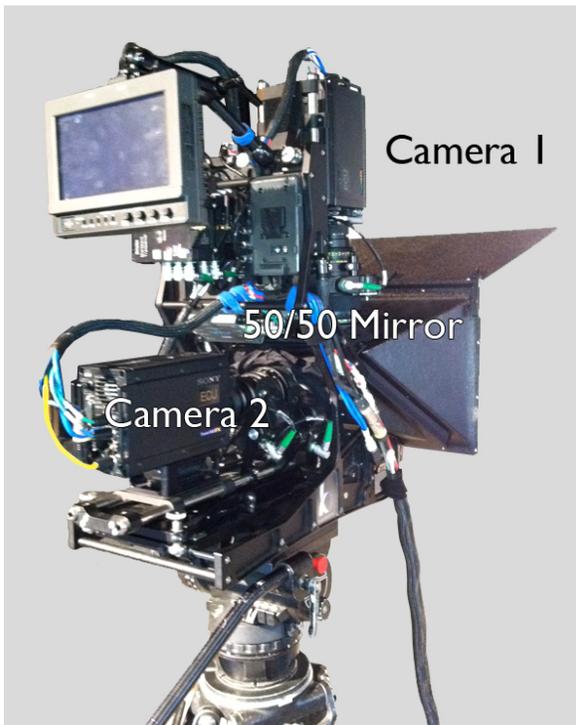
footage. He received support from the Gunzberg brothers who were interested in producing a short documentary. Baker went on to develop the Natural Vision 3-Dimension system, which was used to shoot much of the 3D films that emerged during the boom.[8] Hayes claims that the Telecinema festival influenced Baker and other engineers of that time, yet the Spottiswoode brothers are strangely absent from most of the historical accounts of stereo.[9] This small portion of

Fig. 4

[7] S. James P. Spottiswoode, "Raymond and Dinah in Ottawa 1945. 'The beginnings of 3-D' (Dinah's caption)." Visited on March 4, 2012. http://www.jsasoc.com/Family_archive/rjs-photos.htm.

[8] Ibid, 21.

[9] Ibid, 19.

the history demonstrates how one breakthrough event or invention can influence the overall trajectory of a medium. In our current age, the internet and the digital communities of engineers, experts and enthusiasts enable a new idea or method to go from invention to universal application faster than ever before.

The major factor spurring the explosion of 3D in 1953 was that cinema revenues were increasingly lost to television. Movie studios were looking for a way to get moviegoers to return to the cinema.[10] In 1953, Hollywood's first 3D blockbuster *Bwana Devil*, became the top grossing film of that time. It was hailed as the first Hollywood 3D feature, but in fact, many stereo feature films had come before it, but went unrecognized. Early stereo projection was prohibitively expensive because it required using extra projectors mechanically synched in order to create the two channels. In addition, extra projectionists were needed to operate them. This was a problem, especially in smaller cities and towns where audience numbers were limited.

Shortly after the emergence of stereo films, a competing technology, Cinemascope, was introduced as another attraction to coax patrons from their living rooms. Cinemascope originally used three projectors and a curved screen to create a panoramic experience.[11] Cinemascope also suffered from the high overhead cost of installation and extra manpower. But eventually, anamorphic lenses were invented solving these budget-related issues. Cheaper and easier than before, Cinemascope was significantly different enough

---

[10] Ibid, 24.

[11] Charles Barr, "CinemaScope: Before and After," *Film Quarterly* vol. 16, no. 4 (Summer, 1963): 6, http://www.jstor.org/stable/3185949.

from television to draw audiences to the theatre. The technological advantages and success of Cinemascope spelled the end of the first boom era of 3D in Hollywood. [12] This was the first of many false starts for stereo cinema.

Today, with the proliferation of digital technologies and the ubiquitous presence of stereo projection systems in theatres throughout the Western world, as well as an effort to draw people away from the Internet and into the theatre, stereo film is again a viable commercial medium. The success of *Avatar* and *Hugo* and the mass installation of 3D capable screens on a global scale demonstrates that stereo cinema shows no sign of disappearing. [13] Until the introduction of digital 3D projection, stereo film was limited to selected IMAX theatres, trade fairs, amusement parks and those theatres equipped with the antiquated projection systems from the 1950s. Now, with Real D projection systems in every major city in North America and new types of stereo adaptors for existing 35mm theatre projectors, stereo has overcome the cost limitation that led to its demise in the 1950s. The most popular stereo projection system, Real D digital 3D, is completely digital thereby removing the cost related problems of extra technicians and film cost. However, stereo's place in culture has still not entered into a substantial discourse.

There is extensive experimentation going on by amateur stereoscopic enthusiasts. This trend is similar to the experiments that happened in the 1950s, prior to the first boom of stereo. For example, the invention of portable 16mm film cameras during WWII

---

[12] RM Hayes, *3D Movies: A History and Filmography of Stereoscopic Cinema.* (Jefferson, North Carolina : McFarland and Co. Inc. 1989), 23.

[13] Real D The New 3D "Theatre Locator", http://www.reald.com/Content/Theatre-Locator.aspx

enabled Friend Baker to get his Natural Vision3-Dimension system funded. Today, the

availability[14] of inexpensive consumer 3D cameras has enabled a significant climate of

experimentation. Along with these new cameras, the ease of access to disposable 3D

glasses and inexpensive polarized filters and prototyping materials via the web, amateur

stereo enthusiasts can easily explore alternative stereoscopic capture and projection

methods and experiment with the technology. My studio research is part of this model

of invention as it explores various consumer camera applications and custom stereo

projection methods. This is a simple example of a trickle down model of larger invention

and experimentation that happens with emerging technologies. In the 1950s, the

technology was left over from WWII, but our current accessibility stems from the

massive global information networks and advanced low cost manufacturing occurring

around the globe. Advances in stereo technology are occurring at an accelerated pace

due to this availability of equipment, because of knowledge sharing via the web, and the

growing global nature of its popularity. The amount of companies and countries involved

in current 3D development is exponentially higher than in the 1950s.

The process of stereo is the same in analog and digital production, but the workflow is

significantly different. With the advancement of digital technology, companies from all

ends of the globe have begun to participate, thereby opening significant opportunities to

those interested in exploring stereo. As technology gets replaced in industry and

government funded uses (military, medical, Hollywood), the leftover gear gets sold, or

---

[14] Rick Heineman, "RealD Surpasses 15,000 3D Cinema Screens" RealD The Real 3D, Last modified March 28, 2011, http://www.reald.com/content/media-room-item.aspx?id=423. "(NYSE: RLD), a leading global licensor of 3D technologies, today announced that the company has surpassed 15,000 installations of its 3D Cinema System at motion picture theatres worldwide."

donated for reuse. This gear is often used for more experimental or educational

applications. My practice of experimentation and learning also benefits in this global

climate of stereoscopic development. During the MAA, I have built ties with other

universities and companies exploring stereo. My practice is possible because of these

relationships, where student, university and company reciprocally help and advise each

other in the sometimes confusing and challenging production of digital stereo video.

The actual science for stereo production has been established for years[15] and it is all

relevant in relation to the digital stereo production techniques and equipment emerging

today. The production equipment is improving, and the historically established knowledge

is being embedded into the stereoscopic image creation process. This form is still in flux;

it is changing with the rapid innovations in digital cameras and the miniaturization of

electronics, which are enabling smaller more light weight rigs, greater picture resolution

and higher frame rates. In other words, the historical knowledge is being taken up

globally by the engineers, researchers and amateurs exploring stereo, but the modern

innovations are still not quite determined in culture. This environment of innovation

enables my work in stereoscopic research to influence the development of the

stereoscopic medium both visually in picture and technically in production.

Although it could be said that the present state of stereo cinema bears many similarities

to the 1950s, the tools and technologies are very different. It is the advances in digital

image creation that are the deciding factors in making stereo a viable commercial

---

[15] Lenny Lipton, *Foundations of the Stereoscopic Cinema. A Study in Depth* (Scarborough, Van Nostrand Reinhold Publishing, 1982).

medium after being limited for so many years. Although the technologies do differ, they also share a continuum. Martin Lister insists that "the frequently made observation that digital images are re-workings of received images…is better understood as a meta-form of processes long involving the photographic image; not a radical difference but an acceleration of shared quality."[16] Both technical and creative invention occur within this continuum and it manifests in a shared history though communication networks, online email news forums and discussion groups, trade conventions, and countless other centres of knowledge and Internet sources. The MAA research on this thesis project has been a process in engaging with this shared history.

Experimentation Then and Now

To understand how stereo functions, one can read theory about it or can look through an old View-Master.[17] However, there is no substitute to the understanding one can get by creating one's own stereo pair of photographs, going through the process of aligning images and watching as the different elements pop off the paper or screen. It is a process that has been shared between engineers and artists experimenting in this genre since the emergence of stereo photography until now. The urge to create the effect of stereopsis is like the need to solve a puzzle. Similarities exist between the 1950s and the present not only in film productions in subject matter, film criticism and production technique, but also in the shared quality of explorations and experimentations. For example, there

[16] Martin Lister, "Introductory Essay" in *The Photographic Image in Digital Culture,* ed. Martin Lister (New York: Routledge, 1995),13,

[17] View-Master Model G introduced in 1962. Source: http://en.wikipedia.org/wiki/View-Master. Visited on March 4, 2012. This model is relevant for its ubiquitous nature. I am assuming that most people's original introduction to stereo imagery was through this device or one similar to it.

are several experiments under the umbrella of my practical research currently underway, called the *3D Camera Projects,*[18] which embody the combined history of film, photography and stereography, and do so through an exploratory process of trial and error to understand the principles of

Fig. 5

stereo.

The technological ability to capture, duplicate and manipulate imagery is much more accessible today than it was in the 1950s, and this has an impact on the general growth of the knowledge base of collaborators in my network. The collaborative process in media-making is key, especially when experimenting with new tools. Shared expertise and method feedback are a critical contribution to the learning process. This MAA practice-based research is located within the University, and the collaborators are participants in a variety of areas of cultural production, not solely the film industry. This distinction demonstrates a significant difference between the past and the current circumstances for innovation. From my research, I have only been able to find historical stereoscopic

---

[18] See Appendix 1: 3D Camera Projects

technology development from around the time of the first boom (1950s) in an industrial

context, such as with Friend Baker and Hollywood, or in a cultural context, such as with

the Telecinema festival in Britain, but I have not been able to locate it in an educational

forum similar to my position today. Therfore the context for may practice, though

related to industry is historically unique as it bridges the industrial and education space

of research.

The results of my studio practice are demonstrated through qualitative results from the

unorthodox combinations of new tools. For example, one of the *3D Camera Projects* entitled *TLGLTP* was an exercise in understanding the general principles of stereoscopic video

Fig. 6

production. The Fuji W3[19] 3D camera provides an easy, low-impact first foray into

stereo. "Low-impact" refers to smaller file sizes, more freedom of movement, no need

for a crew, and little-to-no costs, aside from the need for a simple computer with photo

editing software, and of course, the camera itself. Beginning in the fall semester, 2010,

---

[19] A small, handheld camera with fixed interaxial of 75mm used to shoot stills and video in 3D. This camera imposes a limitation with respect to how close one can get to a subject, and therefore it emphasizes the effects of interaxial distance on a final image. This is a very useful learning tool. Source: http://www.dpreview.com/news/2010/8/17/fujifilmfinepixw3. Last visited March 4, 2012.

extending through the summer of 2011, I documented in 3D several performances by a local band. Due to my access to five of these low cost cameras, I was able to invite others to help me shoot the first show. By having others capture video from various vantage points, I was able to get multiple camera angles and alternative perspectives on the experience of shooting 3D. The team I assembled consisted of a professional director of photography, three still photographers and one amateur photographer. The original idea was to shoot with multiple cameras and play with the variety of angles during the editing process. There were problems with the results, but because of the near failure of this first shoot,[20] I realized that a focus on the basics of stereography, based on the limitations of the Fuji W3, was needed to continue the project.

The second shoot afforded better results. And the third and final shoot captured any remaining material necessary to complete a short three-minute document of the experiment. The results of this production experiment lead to a first foray in stereo post-production. Playing around with the material in post-production further revealed the limitations and benefits of the camera, as well as the different softwares. Some of the shots demonstrated both the unorthodox combinations in editing and framing of shots in 3D. This exercise also made apparent to me the importance of a collaborative process when working in a new medium, particularly by encouraging the experimentation of others under the scope of my project.

---

[20] Less than 10% of the material was usable for reasons attributed to the wide interaxial of the camera; however the results from the range of shooters, including myself, did provide a cross section of do's and don'ts.

Although a great deal of material exists on the process of making stereoscopic film, there is little literature that develops the language of stereo films for formulating academic conclusions. In other words, the proliferation of digital stereo cinema is a new territory for exploration both technically and theoretically. There is little academic literature on the subject of dimensional films theory. Consequently, my MAA studio-based practice has been an discovery adventure in stereo, exploring both the theoretical and technical aspects of the medium. I researched the history of stereo to consider where the technology comes from, and I explored the technology to better understand the visual language of stereo and how to communicate with it in a nuanced way. In the next section, I describe cultural implications; the impact of digital stereo production on our contemporary culture.

Theoretical Context

This next section looks at the relationship between Jonathan Crary's idea of the observer and Giorgio Agamben's notion of a subject as a product of an apparatus.

Crary describes the changes to visual culture, beginning in the 1800s, that were precipitated by scientific invention and the process of understanding and quantifying human vision. These changes to culture manifest through vision devices like the phenakistoscope and stereoscope, reorienting the viewer and changing the populaces understanding of vision. The implications of these changes are far-ranging but Crary mainly focuses on art, photography and cinema, and their effects on Western visual culture. Crary formulates the idea of the observer as a human location where these

changes in culture are taking place in order to contextualize them around perception

and reception. The scientific discoveries made around human vision (how the eye

functions) lead to further power and control over human perception by way of the

scientific devices that were developed throughout the studying process. This control

through devices is explored by way of Giorgio Agamben's ideas about the apparatus.

Agamben's description of the apparatus resonates directly with my own studio work,

which focuses on subverting and changing the intended uses of stereo tools, resulting in

a new sort of apparatus. By considering stereo itself as an apparatus, and then

experimental stereo film within that, the full concept of apparatus thereby places

stereoscopic media in a critical discourse that functions between art, experience and

perception. Taking off from Crary and Agamben's socio-historical interpretations, I find

myself reflecting upon shared qualities of our contemporary culture drawn through a

history that begins in the 1800s. As we look at the media and devices surrounding us

transforming into either digital versions of older analog technologies or completely new

hybrid digital devices that reference old technologies, we find ourselves living in a

contemporary shift with many similarities to the nineteenth century. So, just as Crary

discusses the creation of the observer by the massive shift in visual culture, I see a similar

current transition from an analog era to a digital one taking place within our culture. We

are *digital observers*.

I would like next to look at theories around the intertwined histories of photographic

mediums. I interpret Lister's idea of 'shared quality' as a sort of mechanical, visual or

cultural trace that references a precursor technology. A very simple current example of

this could be the Instagram application for the iPhone.[21] This application takes photos from the onboard camera of the iPhone and applies digital filters that replicate several effects traditionally used in analog photography. This application is similar to some of the early visual devices that contributed to the metamorphosis in the reception of visual language during the nineteenth century. A hybrid device like the iPhone and a nineteenth century stereoscope similarly direct the viewer, which is evident in the cultural changes predicated by the use of these devices. In other words, these objects affect behaviour and the cultural perception of the photographic image. Stereoscopic filmmaking is a particularly effective example of this relationship because of its slow rise to popularity throughout the history of film, photography and video. With this in mind, using references to Jonathan Crary's *Techniques of the Observer* and Giorgio Agamben's *What is an Apparatus?*, I will now focus on the relationships between the historical discourse of the stereo medium and my own studio-based practice.

Jonathan Crary's writing in particular resonates with me in relation to the processes and ideas around the creation of my work. Particularly in my studio work, I found I respond most strongly to Crary's book *Techniques of the Observer* — not so much as a foundation for my work, but rather as the lens through which to view my research and practice. It provides an historical context for the changes currently taking place in visual culture which my work responds to.

---

[21] Instagram Homepage, Burbn, Inc., http://instagr.am, last modified March 28, 2012.

In the preface to his historical analysis, Crary describes how new imaging technologies emerge replacing older forms, and the unique relationship between the two:

> The formalization and diffusion of computer generated imagery heralds the ubiquitous implantation of fabricated visual 'spaces' radically different from the mimetic capacities of film, photography and television…Obviously other older and more familiar modes of 'seeing' will persist and coexist uneasily alongside these new forms. But increasingly these emergent technologies of image production are becoming the dominant models of visualization according to which primary social processes and institutions function.[22]

In relation to my studio practice, Crary's "emergent technologies of image production"[23] include stereoscopic production equipment, new high resolution digital cameras and digital post-production workflows. Crary lists several examples of technologies in the text, but the technologies used in my studio-based research did not fully exist when the book was written. Still, they are definitely worthy of inclusion since they are components of the "dominant model of visualization" today. For the purposes of this paper, his concept is used to refer explicitly to the cultural and technical overriding of analog technologies by their digital replacements.

Crary refers to our current digital moment as a new break[24] analogous to the change in popular representation in the nineteenth century. Today, digital imaging technologies are

---

[22] Jonathan Crary, *Techniques of the Observer. On Vision and Modernity in the Nineteenth Century.* (Cambridge: MIT Press, 1990), 2.

[23] Ibid, 2.

[24] Ibid, 3

taking over from "the older familiar modes of seeing," such as analog film, photography

and television. A prime example of this scenario happened in early 2012, when Kodak

Eastman, the inventor of film, filed for bankruptcy.[25] This development spells an official

end to the massive global use of 35mm motion picture film stock and exemplifies

Crary's ideas around the impending dominance of the digital. In this sense, the triumph of

digital imaging sensors over analog film has a direct influence on our everyday lives and

the structures of our society, in a similar way to the massive cultural shift in visuality that

Crary outlines in his book. Part of this modern shift is the enabling of the consumer to

become a producer. For example, stereo is re-emerging now partly because the

technology is cheaper, lighter and smaller than it ever has been. Besides weight and size,

the general costs are greatly reduced because of the climate of rampant technological

production happening on a global scale. The fall of celluloid was inevitable and stereo is

simply one of the symptoms of the digital shift in visual culture taking place today.

 In relation to my work, I am considering the uneasy coexistence of the old and new

"modes of 'seeing'."[26] These older modes "were forms of analog media that still

corresponded to the optical wavelengths of the spectrum…located in real space."[27]

Digital workflows, based on analog processes of film and photography, offer new ways of

creating, mixing and adjusting images that are far removed from the original chemical

---

[25] Ben Dobbin, "Former trailblazer Kodak files for Chapter 11", Associated Press. Accessed on Jan 19th, 2012. http://hosted.ap.org/dynamic/stories/U/US_KODAKS_LEGACY?SITE=TXPLA&SECTION= HOME&TEMPLATE=DEFAULT.

[26] Jonathan Crary, *Techniques of the Observer. On Vision and Modernity in the Nineteenth Century.* (Cambridge: MIT Press, 1990), 2.

[27] Ibid, 2.

processes. Within analog and digital workflows there are crossovers between the technologies and methods, such as lens choice, camera support, framing of shots or digital image manipulation that simulate the look of analog. These modes of production similarly manifest in old analog equipment and new digital gear. For example, over the past year and a half, I have been exploring the uses and abilities of stereoscopic beamsplitter rigs for creating 3D video material. Alongside this trajectory is the creation and modification of analog/digital camera support equipment, such as a motorized time-lapse photography system, lens tracking adapters and body mounted stunt camera systems.[28] The production practices, of building, modifying and updating existing camera support technologies to work alongside newer digital imaging tools are increasingly reliant upon new digital rapid prototyping techniques. My work draws from both old and new methods to further blur the line between digital and analog practices in stereo cinema.

Crary's central thesis concerns "the origins of modernist visual art and culture in the 1870s and 1880s."[29] He reframes the historical debate about the changes in practices of representation by suggesting that the shift was a result of larger societal changes, rather than the cause of them. A central component of his idea is based on the consideration of a change in the nature of how people consumed images, the new innovations in technology and the social organization that resulted from these advancements.

---

[28] See Appendix 2: *Whizard Projects*

[29] Ibid, 5.

Using the Latin etymology "*Observare*: to conform one's action" Crary contrasts the observer, an active viewer, to the spectator, who is non-participatory and stationary.[30] Crary's book is about the formation, in the early 1800s, of the observer. He defines this new active viewer, or observer, as coming into being as a result of a "break with classical models of vision" and as being "inseparable from a massive reorganization of knowledge and social practice"[31] that took place in the nineteenth century. Crary cites the mediums of popular parlor novelties, the stereoscope, and the precursor to cinema, the phenakistoscope, as technologies that reposition the viewer and change the way people consumed art, imagery and information.[32] These devices are symptoms of, and not the direct cause of the greater changes taking place in art and visual culture in the nineteenth century.

As an historian, Jonathan Crary's intentions are specifically related to art history and visual culture. He draws broadly on developments in nineteenth century science and culture to create a wider context for the history of modernism in art. Crary's theories resound strongly with my research interests because they "open up the discussion for practices and methods that don't directly fit or subscribe to this locked modernist history and examine other trajectories seldom acknowledged in the world of contemporary art and modernity."[33] My studio work resonates with Crary's idea of an

---

[30] Ibid, 5.

[31] Ibid, 3.

[32] Jonathan Crary, *Suspension of Perception. Attention, Spectacle, and Modern Culture,* (Cambridge, MIT Press, 1999), 3. "…historical transformations in ideas about vision were inseparable from a larger reshaping of subjectivity that concerned not optical experiences but processes of modernization and rationalization."

[33] Jonathan Crary, *Techniques of the Observer. On Vision and Modernity in the Nineteenth Century.* (Cambridge, MIT Press, 1990), 15.

alternative history and discourse around processes, technology and inventions and their influence on our visual history.

Technology was not the sole factor of the reorganization of knowledge that Crary depicts. The compounding of many practices that involved both physiological and psychological research, as well as technical invention, contributed to the reorganization of visual culture begun in the early 1800s. Beginning shortly after the turn of the nineteenth century with the scientific writings of Johann Wolfgang von Goethe about the subject of retinal afterimages,[34] a major shift in research practices emerged and influenced the development of devices for viewing. Crary points out that the empirical study of human vision became more focused on optical truth, and thus, these scientific processes lead toward the quantification of human vision. By understanding how the body received and translated imagery and light, more control could be imposed to direct that vision. Ultimately, the process of "producing and regulating human subjects"[35] began in the form of visual devices that were originally invented for scientific study, and which then became forms of popular entertainment. The apparatus used to view a stereoscopic film also creates regulation. One enters the theatre and places glasses in front of one's eyes in order to regulate the watching and production of an illusion.

---

[34] Ibid, 98. Crary begins his argument in this chapter by discussing Goethe's *Theory of Colours.*

[35] This quote comes from a footnote about Purkinje, the inventor of the phenakistoscope and the classification system of fingerprinting. Crary describes the fingerprinting system as "another technique of producing and regulating human subjects." This describes Crary's point in a single sentence and leads into Agamben's theory of an Apparatus. Ibid, 104.

A common tendency in cinema studies is to group early pre-cinematic devices together, particularly the phenakistoscope and the stereoscope, as early visual devices that did not achieve the photographic reproduction of reality in motion, and which therefore are considered as unfinished experiments. Crary believes that "such an approach often ignores the conceptual and historical singularities of each device."[36] The important commonality joining each of these handheld devices is that they all direct and control the viewer's attention. These devices were "initially...for purposes of scientific observation but were quickly converted into forms of popular entertainment. Linking them all was the notion that perception was not instantaneous, and the notion of a disjunction between eye and object."[37] Users of the devices were simultaneously studied to gauge the influence the devices had on their eyes. It is not until Crary's book that the influence of these devices upon the observer's subjectivity is explored. My practice considers this history in relation to modern stereoscopic viewing.

Today, a similar process is underway with the invention of digital stereo processes and technologies and in research between the optical sciences and the applied industry technologists developing new gear. One particular example can seen by way of research that examines the relationship between frame rates and viewer comfort with stereoscopic displays taking place at UC Berkeley [38]. A direct comparison can be made

---

[36] Ibid, 110.

[37] Ibid, 104.

[38] Hoffman, D.M., Karasev, V.I. & Banks, M.S. "Temporal presentation protocols in stereoscopic displays: Flicker visibility, perceived motion, and perceived depth." *Journal of the SID*, 19/3, (2011): 255-281. http://scitation.aip.org/getpdf/servlet/GetPDFServlet?filetype=pdf&id=JSIDE8000019000003000271 000001&idtype=cvips.

here between vision research in the nineteenth century and today. In the 1820s Jan

Evangelista Purkinje designed and studied the effects of the phenakistoscope upon the

observer. This device became a popular source of entertainment. Marty Banks and his

research team at Berkeley are currently studying the digital observers of our time as

stereo 3D proliferates into a mass global form of popular entertainment. This

demonstrates the continuation of research into constructing the observer and a

further refinement into the quantification of human vision first began in the eighteenth

century.

The stereoscope and the phenakistoscope acted to control and mechanize the

observer. They served as early tools for scientists to understand more precisely the

particularities of binocular vision. Crary discusses the similarities between the

experience of the stereoscope and some paintings during the late 1800s. His claim is

that the stereogram and new explorations in painting both emerged from a common

scientific root of inquiry, partly due to the optical discoveries of the era.[39] Aside from

the technique of colour separation used in Georges Seurat's *Sunday Afternoon on the*

Island of La Grande Jatte, the way the figures are flattened and laid out in space

references the visual stacking that happens when looking through a stereoscope.

Though Crary cannot prove that Seurat used a stereoscope while painting the work, it

is reasonable to assume that Seurat had used the device considering their popularity at

the time.

---

[39] Jonathan Crary, *Techniques of the Observer. On Vision and Modernity in the Nineteenth Century*. (Cambridge: MIT Press, 1990), 126.

Giorgio Agamben's idea of the apparatus and the subject are critical in placing Crary's

observer into a contemporary context. Crary's observer is similar to Agamben's idea of

the subject. Crary and Agamben both interpret Michel Foucault to support their ideas.

Crary writes, "for Foucault, nineteenth century modernity is inseparable from the way

in which dispersed mechanisms of power coincide with new modes of subjectivity."[40]

These mechanisms of power are new apparatuses, for example, and more specifically in

the context of this paper, stereoscopic media. Agamben's formulation of the apparatus is

a direct interpretation of Foucault's original idea taken to "a point of undecidability

where it becomes impossible to distinguish between author and interpreter."[41] In *What*

is an Apparatus? Agamben begins to go beyond Foucault's research and writing, beyond

the idea of *dispositif,* and he fleshes out the concept more fully. Agamben's

interpretation of Foucault gives Crary's further relevance to today's media climate.

When considering Agamben's text, Cray's explanations of the effects and functions of

early visual devices within the historical context of Western visual language are given

more relevance to today, twenty years after the text was originally written.

Both author's conclusions derive from interpretations of Foucault's idea of *dispositif,*

discussed in an interview in *Power/Knowledge Selected Interviews and Other Writings*

(1980). Agamben directly addresses the fundamental ideas of power and control first

explored by Michel Foucault. According to Agamben, "the term 'apparatus' designates

that in which, and through which, one realizes a pure activity of governance devoid of

---

[40] Jonathan Crary, *Techniques of the Observer. On Vision and Modernity in the Nineteenth Century.* (Cambridge, MIT Press, 1990), 15.

[41] Giorgio Agamben. *What is an Apparatus? and Other Essays.* Ed. Werner Hamacher. Trans. David Kishik and Stefan Pedatella. (Stanford: Stanford University Press, 2009), 13. Agamben's notion of apparatus, is a direct extension of Foucault's *dispositif*, referenced in "The Confession of the Flesh" (1977) interview, in *Power/Knowledge Selected Interviews and Other Writings,* ed. Colin Gordon, 1980, 94-228.

any foundation in being. This is the reason apparatuses must always imply a process of subjectification. That is to say, they must produce their subject."[42] To simplify, an apparatus on its own represents a viewpoint. It has the capacity to control the being who uses it or lives within it. That is how it produces its subject. This can happen to varying degrees. On its own, an apparatus has little power until a person interacts with it and allows its embedded qualities of governance to influence them. An apparatus directs one's relationship to the world. Stereo is a literal apparatus and it actually controls and directs one's eyes to produce an illusion. The stereoscopic experience possesses the capacity to influence its subject, but it is still in its infancy in terms of a language of communication. Stereo draws an observer further into the image. Its ability to combine depth with a story adds has physical and emotional effects upon the viewer. I do not claim to know the specific combinations of stereo and story to achieve this, but through my stereo experiments I look to explore some different combinations of depth, framing and mood.

The preceding theoretical framework enables the discussion around how culture has been historically influenced by emerging media and, therefore, how to discuss my current stereoscopic practice.

---

[42] Giorgio Agamben. *What is an Apparatus? and Other Essays.* Ed. Werner Hamacher. Trans. David Kishik and Stefan Pedatella. (Stanford: Stanford University Press, 2009), 11.

Adventures in Stereo – My Stereo Practice

The following section of the paper details the studio method. The concepts and ideas elucidated from the previous section are embedded within my practice. Crary's historical reformulations and links to our contemporary situation in relation to stereoscopic video and contemporary visual culture ties the history of stereo together with Agamben's subject of the apparatus. This construct is the foundation of a digital observer. More specifically, the scientific experiments turned popular entertainment during the nineteenth century paved the way for a continued influence of the sciences on popular visual culture and the production and regulation the observer. As the sciences develop an ever-increasing understanding of human vision, demonstrated through the ongoing experiments at UC Berkeley, the digital observer is in a rapid state of change that I suggest will continue for years to come. In the process of understanding how these changes will manifest, I have also been exploring the language of stereo video in order to contribute to the reorientation of the digital observer. The techniques discovered through the experiments outlined in the Appendices explore the physicality of stereoscopic video, and how the different experimental techniques could be used in narrative or experimental filmmaking.

Beginning with an introduction to my work before I began the MAA at Emily Carr, I describe the intent and outcomes upon entering the program. This description will add some background to the main areas of interest and how they have manifested in the series of experiments outlined in the Appendices. Following this, I will tie in the previous theoretical section to my applied practice and my conceptual approach with ideas of

embodiment through technology in art. Included are some examples of artists who employ a similar embodiment in their work. I compare my method of experimentation with stereo to Michael Snow's work. In a 2005 interview he details his process of working and creating his experimental films, and I reference some of his methods in my approach to stereo filmmaking. Finally, I explore the necessity of collaboration and experimentation in the filmmaking process in reference to the work of Phillippe Baylaucq and Wim Wenders and their collaborators. A reflective conclusion follows this.

I entered the MAA program at Emily Carr with a desire to marry my professional and artistic practices. Prior to entry into the program, I was developing my professional skill in rapid prototyping, machining and designing accessories and equipment for film and photography. My artistic practice was mainly video based, and the conceptual nature of the work was in dialogue with technology and its influence on society and visual culture, which continues today in the MAA. My artistic practice includes drawing, photography and video production, and the MAA program adds stereo to each of these areas of practice. The S3D Research Centre had just opened in May 2010, and their research efforts were just getting started. The outcomes I set for myself during the degree were to develop new tools, to learn how to apply stereo to my existing practice, and to harness this knowledge toward the creation of new work. Some of my early experiments explored the placement and control of camera position. These initial explorations were undertaken in 2D with some experimentation in 3D.[43]

---

[43] See Appendix 2: *Whizard Projects*. The Whizard Strap-On is a stunt camera that attached a digital SLR camera to the actor to give a stable and unique Point of View camera position.

Theory, Practice and Embodiment

The relationship to the digital observer through the apparatus of stereo in my work, from a very rudimentary use of point and shoot cameras to complex keying techniques, directly relates to my study of Crary and Agamben. Through the comparison of Jonathan Crary's idea of the observer and Giorgio Agamben's production of the subject, I am contextualizing the physicality of stereo video in relation to its affect upon the digital observer in our contemporary culture. My work emphasizes the physical nature of stereo. The experiments explore stereo with the express intention to discover mistakes, anomalies and anything that otherwise thwarts the conventions of orthostereoscopic production. John T. Rule and Vannevar Bush defined "an orthoscopic view [as one] . . . in which the resultant image is of exactly the same size and shape and has the same location with respect to the observer's eyes as the original scene."[44] Most of the technology and techniques of stereo, until recently, have been exercises towards the recreation of reality as a bench mark upon which to base the designs of camera systems. The Spottiswoode Stereo Techniques camera system was based on this principle in the 1950s. Today, the 65mm interaxial distance (equal to the average inter-ocular distance of an adult human male's eyes) of "the first integrated twin-lens 3D camera recorder...capable of recording full HD video to its memory card"[45] by Panasonic demonstrates a design based on the orthostereoscopic principle. As newer cameras emerge on the market this design principle is no longer the norm. This does, however,

---

[44] John T. Rule. and Vannevar Bush, "Stereoscopic Photography", *Handbook of Photography*, ed. Henny and Dudley, Whittlesey House, 1939 quoted in Lenny Lipton, *Foundations of the Stereoscopic Cinema. A Study in Depth* (Scarborough, Van Nostrand Reinhold Publishing, 1982), 134.

[45] Panasonic Website, Panasonic Corporation, last modified March 31st, 2012, http://pro-av.panasonic.net/en/3d/3dcamera/index.html.

demonstrate the restrictions that were being placed upon 3D technology by this design concept until just recently. Specifically that the ideal interaxial spacing of cameras is the 65mm or the distance between a caucasian adult male's eyes.

Because my work is not directed toward the mainstream, it will be disseminated in film festivals, on the web or in an art gallery context. The work is experimental from a practice-based approach; the end result is not always anticipated, and it incorporates mistakes as beneficial to the process. This approach is oriented around creating applied techniques of cinema using both new available equipment and modified older technologies. The ultimate goal of the 20-month degree program was focused on a process discovering how to work within the stereo space, developing tools for cinematic applications and collecting this knowledge into an arsenal of stereo communication techniques outside of the methods dictated by a dominantly orthostereoscopic understanding of 3D imagery.

My process-based studio approach is one of first production, then review. Observation plays an important role in determining the desired stereo effects. The goal is to work with the tools enough so that during the creative process one can plan and respond to challenges and ideas with an instinctual response, so as to better predict the outcome. It will take many more years of continued practice to achieve this outright, but the time spent over the last year and a half has offered real practical experience. Though there are various approaches to shooting a film, it is safe to say that commercial narrative film production tends to be structured differently than most more experimental approaches,

by its very nature. When shooting more experimental work with smaller crews, there is more freedom afforded to respond intuitively to location, actors, and dialogue on set. The 3D camera tests[46] all had one thing in common: they were exercises in observation. The ultimate goal was to generate video results, study the outcomes for traces of the unfamiliar, and to then incorporate these visual unfamiliarities into subsequent experiments. I will address further this idea of the unfamiliar below.

Russian formalist Victor Shklovskii, in an essay entitled *Art as Technique* (1917), discusses the concept of defamiliarization. The Russian equivalent word *ostranenie* translates literally to 'making strange.' This early formalist concept is a useful guideline to help understand the process used in evaluating my stereo video results. The basis of his concept is summed up well by this statement: "The purpose of art is to impart the sensation of things as they are perceived and not as they are known."[47] At the core of the idea is the argument that art can take you out of the familiar in many ways. This opens up a possible discussion of Heidegger's idea of the essence of art or Benjamin's notion of aura, (both were contemporaries of Shklovskii) but that is not the intention for introducing Shklovskii's theory here. This concept from 1917 was a new idea about how to critique creative literature. In an analogous way, Shklovsii's method can be used to interpret the 3D camera projects, to critique the creative stereo mechanisms at work in the video experiments.

---

[46] See Appendix 1: 3D Camera Projects

[47] Viktor Shklovskii. "Art as Technique", *Russian Formalist Criticism: Four Essays*. Trans. Lee T. Lemon. (Lincoln: University of Nebraska Press, 1965), 12.

In a footnote to the 1965 translation, the editor expands on Shklovskii's critique of the poet Andrey Bely: "The suggestion is that poems with 'easy' or smooth rhythms slip by unnoticed; poems that are difficult or 'roughened' force the reader to attend to them."[48] This technique of 'roughening' is the element of defamiliarization that needs highlighting for my purposes and applications. It best describes what I undertake during the review process of the stereo video experiments. While shooting a particular idea, the production begins with a certain set of goals and shots. Depending on the circumstances, different things emerge in the shot, possibly as a result of technical difficulties, or even blatant mistakes. But by their 'roughened' quality, elements stand out in stereo that open new avenues for exploration. The implication in Shklovskii's text is that 'roughening' was deliberate, but in my process it is treated as a serendipitous discovery and later advantaged as technique.

There are two specific examples of how Shklovskij's idea emerges during my production. The first example is a keying technique that I was devised in an early experiment.[49] I have been implementing this during production of my grad work. Second is serendipity. I am still in the process of exploring the possibilities of stereography. In the first example framing and composition and the arrangements of character with mise en scène work better in 3D than in 2D and was discovered by accident.

---

[48] Ibid, 12.

[49] See Appendix 1 - Camera Projects: Side by Side with Greenscreen

The first example is how an on camera mistake during can be a wonderful discovery when shooting in 3D. This happened while reviewing material after a day of shooting. The main character was walking along the edge of a bluff. The camera was on a boat shooting towards the actor. The bluff had a slight incline and the main character was dragging a large blue curtain. As she struggled up the incline she slipped and fell behind a low boulder and out of sight. In a normal 2D environment the director would most likely cut and restart the scene. I did not cut, however, and we rolled until the end of the action. Upon reviewing the material later, we watched the actress slip behind the rock and realized that the shot was the best of all the takes. The layering of the rocks behind and in front of the character emphasized the space as she disappeared behind the rock. As a viewer I understood the character was behind the rock because the space makes sense in stereo. In two dimension, the figure disappearing completely behind the rock destroys any illusion of depth. Shklovkij's technique became apparent here as we re-watched the material. The scene works in the context of defamiliarization because its composition is unusual and draws you in using elements located on the z-axis.

During production it is difficult to watch for the roughened elements on set. Though their is on-set monitoring in 3D, the roughened sequences are not always evident immediately. Most often they emerge upon review at the end of the day or during the post production process. This is especially true of the keying technique I employed which could only be created using post production techniques. The keying technique is achieved by shooting practical 3D material with a green or blue screen used as a prop. The very large cloth is being dragged around by the main character. The second part of the

process is to key out (make transparent) the coloured cloth and layer more stereo material in behind, creating a stereo scene within a stereo scene. This is an intentional attempt at roughening. Upon review of a scene, the cloth maintains a sense of roundness. The material has depth in the folds and with another space set in behind/through the cloth the arrangement creates an unfamiliar experience and demonstrates Shklovskij's concept in relation to 3D.

Stereoscopic cinema is a distinctive physical experience, different than traditional monoscopic film. Each eye receives a separate image stream and the image is resolved in the mind. André Bazin, in *The Myth of Total Cinema,* focusing on the origins of cinema, writes, "In their imagination, they conceived of cinema as the complete and total representation of reality. From the outset they foresaw the creation of a perfect illusion of the outside world through sound, colour and three-dimensionality."[50] The contemporary version of this statement could now be changed from the "illusion of the outside world" to the illusion of *any* world. Bazin's statement is based on the dream of depicting reality as closely as possible to an embodied experience. This tendency is visible in the experiments toward the quantification of human vision in the nineteenth century that Crary explores, as presented in the first section of this paper, and the orthostereoscopic camera design of most 3D cameras up until 2010.

---

[50] André Bazin, "The Myth of Total Cinéma," in *What is Cinéma?* Trans. Timothy Barnard, (Montreal: Caboose, 2009), 15. He refers to the early inventors of the components necessary to realize moving pictures such as Nicéphore Niépce, Pierre Leroy, Georges Demenÿ, among others.

I am fascinated by this historical drive for verisimilitude. Conceptually, I create work around the impossibility of this representation of the real. I embrace this idealistic dream that an embodied experience can be recreated through technology; striving toward this unattainable goal can best be described as my studio method. The thesis project draws on Bazin's idea in early cinema history. Part of my process involves engaging in this antiquated view of cinema. By attempting to recreate an embodied representation of reality, the process becomes a futile pursuit of a technocratic vision. The term technocracy was originally used to designate the application of the scientific method to solving social problems. The prominence of technocratic ideologies in our techno-crazed culture is rather frightening. My work emphasizes the physicality of memory and the limits of technology versus an actual lived experience - questioning societies faith in technology. The goal is to critique the tools of progress while exploring the fringes of their use. Ultimately, my work will manifest in a video and an installation, and I measure its success by how physical, visceral and memorable of an experience I create. The inclusion of stereo into this process is a logical step because of the very physical nature of the medium.

At this historical moment, Bazin's famous statement "Cinema has yet to be invented!"[51] is truer than ever. Visual culture and cinema is constantly in flux in our digital age because of new and more powerful imaging tools and the systems of dissemination are also more plastic. Whether it is web-based stereo anaglyph videos or immersive stereo environments, my final project will contribute to this ongoing invention of cinema.

---

[51] Ibid, 17.

The final project manifests in a short experimental stereoscopic film. The project is still in production. Included in Appendix 3 are storyboards and a short treatment for the film. Accompanying this film is a stereo installation. The references that are central to the methodology (Crary, Agamben and Lister), detailed in earlier sections of the essay, are to position experimental stereo filmmaking techniques in our contemporary culture. The

Fig. 7

following examples consider the experiential nature of some installation art. Though these examples are not stereoscopic, they relate to the experience of a media work. By focusing on the physical experience of a piece, they therefore offer a sensibility, precedent and reference to my

work and process. Also, the process of collaboration when creating media-based work is explored to further contextualize the process.

Experimentation within my working process is currently directed toward the creation of a stereoscopic extension that is integrated into an exhibition space. The idea is to not confine a viewer to a seat, but to enable them agency to move within the space. I wish to extend a real space with an illusory stereo projection on a wall. In other words, the viewer walks into what they think is a small room in a gallery, but instead they enter into

the illusion of a much larger space. These tests explore stereo projections used outside

of a theatre context. I propose that a stereo projection employed to extend a physical

space to create an illusion of depth offers an unlikely experience to the viewer. The

objective is to create a disassociation in the experience, where the viewer questions

where they are, as well as who and what they are looking at. This is important because

the installation space adds the further physical dimension of movement to the stereo

viewing experience. Because of the unfamiliar setting for the stereo elements, it will be

an exercise in questioning the subjectivity of the viewer in relation to a stereo image and

space. The installation would be a definitive example of an apparatus guiding towards an

unfamiliar experience for the viewer, and in turn directly affecting their subjectivity.

The proposed installation experience recalls the work of Janet Cardiff and George

Miller's *Paradise Institute (2001)* for its illusory quality and attention to the language of

cinema. *Paradise Institute* is a small chamber within the gallery that several viewers are

guided into. While inside the illusory space it is as if one is sitting on the balcony of an

immense film theatre. Their work has an element of tromps d'oeil in real dimensional

space. I explore a similar embodiment through illusion in the proposed installation,

meshing projection with a real space.

I use James Turrell's *Mill Run III* (2006), an example of his Ganzfeld technique, as a

reference for understanding how to direct the viewers to question their own

perception. Similar to Cardiff and Miller's installations, the viewer enters physically into

Turrell's illusory space. Cardiff and Miller's practice is a representational illusion, a

theatre, as opposed to Turrell's piece, which is unrecognizable as a representation. "Ganzfelds are evenly illuminated and undifferentiated fields, first explored in perceptual psychology. Turrell's works create similar homogenous, undifferentiated light fields of saturated color that seem to hover, their distance and location difficult to specify."[52] The project installation will explore a combination of these different kinds of illusory sensibilities. The keying techniques for example, will mimic Turrell's effect of forcing the viewer to question their own perception.

In the process of learning stereo video, I have discovered that it is a challenge to actually view many examples of stereo film. The lack of historical examples, let alone their availability, makes studying this re-emerging form problematic. Of course, monoscopic film is still relevant; our visual culture is based on it. And it is still necessary to understand 2D conventions as well as 3D. More specifically, films examining the camera as a protagonist, such as in the work of Michael Snow, help provide a reference to film that is created with a structural approach (and which also happens to be Canadian). In regard to Snow's films, 'structural' refers to a methodology, whereby the limitations of a device are explored, subverted, reflected or considered in the creation of the image. A cyclical approach of shooting, watching, editing and interpreting what the next move will be allows for improvisation and reaction to the material. Snow writes in an email interview in 2005 about the approach to his experimental film *La Région Centrale*:

---

[52] Richard Andrews, "James Turrell: Knowing Light" *Curatorial Statement*, last modified March 21, 2003 – February 8, 2004, Stroum Gallery, http://www.henryart.org/exhibitions/show/205.

I made this film, and all my films, in order to provide an experience that can't be encountered any other way. If a spectator wants a message, he or she can find one, but I never start a film with the conviction that I want to 'say something.' However, because of the 'dialogue' between the elements in my films, they all 'say something(s)' and I do very much consider the possible meanings that each film is involved in.[53]

Snow enlisted a technician to create the mechanism that would direct the way the film was made. The limitation in this case was a sphere, so the camera could move in a way never before seen. *La Région Centrale* is a 180-minute film of the Québec landscape of Chicoutimi. The camera is mounted to a custom camera support device that allowed for complete 360˙ movement on any axis. Working within the limitations of film at that time, Snow could only shoot for a maximum of ten minutes per reel of 16mm film. Postproduction choices were many and happened over an extended period of time. This indicates that a responsive and reflexive method was used, and the quote above confirms this. Snow's consideration of space is also worth noting. His use of lens zooms and physical positions, as well as camera movement, were important experiments for 2D cinema history.

My stereo experiments work in a similar way, and the final project is progressing along a similar trajectory. The rapid turnover of material—being able to shoot and view the material in the same day—accelerates the process and is

---

[53] Willie Varela, "Canada's Multimedia Master: An E-Mail interview with Michael Snow." *Journal of Film and Video.* Vol. 57, No. ½ Spring / Summer, (2005): 28.

advantageous to the kind of experimentation I am engaged in. The use of keying

techniques and stereo spaces located within stereo space harkens back to

Snow's words about unique encounters in cinema. In his quote, he refers to the

camera's physical movement, something at the time that had never been achieved

before. The keying techniques I am exploring, to the best of my knowledge, have

also never been explored before in stereo. Both Snow's *La Région Centrale* and

my camera experiments are employing a cinema apparatus to provide a unique

physical/visual experience.

Collaboration

The cinematic production model and history of stereoscopic film production relies

heavily on methods of collaboration. Cinema is a collaborative medium. The number of

people that it takes to create a work, especially with the addition of another camera in

stereo, demands a reliance on other professionals and colleagues. From image capture

through to postproduction—even if as a practitioner you have knowledge of the

processes—collaboration is inevitable. Technology sharing also happens interpersonally

between professionals and companies. This exchange of knowledge, labour and expertise

happens on many levels, and it is another example of the shared quality that transverses

the history of the photographic image. In the case of the final project, I will be directing

the look and feel of the work, but will rely on others during the process of production

to improvise and tell me what they are seeing. I am currently collaborating on the script

with Canadian author Michael Boyce. The ongoing discussion, on a day-to-day basis, in

any non-solo artistic endeavor is integral to the process.

Wim Wenders, in preparation to make *Pina* (2011) describes his challenge of shooting in 3D.

> In 2007, 3D was not really on the map of the cinematographic landscape. There was not much to be known about it. Rumors of equipment, of things to come. I was fishing around in the dark. It seemed way too early to want to do a live action film. The only movies that were starting to come out were animation films, some of them really well made, and a couple of unspeakable horror films that rightfully carried the name of their genre. Nothing I could possibly show to Pina to support my wishful thinking of the new language. I had to find somebody who would know something… You can't even begin to understand how lucky I was! I asked my neighbor.[54]

The rest of Wenders' story is highly informative, but this quote solidifies three things in the context of the research. It must be noted that it is the cusp of 2012, and only a handful of lower budget pictures have been released in 3D; most of these film's names are not worth mentioning. Very few films since the reemergence of stereo have contributed to the language of 3D in a memorable way where new practitioners will look to the techniques and use them as a reference. My practice based thesis research has been running parallel to this digital renaissance of 3D and the medium is still young and developing. Not only was Wenders collaborating with Pina Bausch to develop this film, he looked to his network to fill his knowledge deficit, in this case his neighbor, Alain Derobe. In the end, he worked with Derobe, a pioneer stereographer, who receives the credit over the director of

---

[54] Wim Wenders, "Keynote Speech at the Toronto Stereoscopic 3D Conference." Personal Weblog of Wim Wenders. Last updated June 11, 2011. http://www.wim-wenders.com/archives/2011-06-Toronto-Keynote-Speech/toronto-keynote-speech.htm.

Fig. 8
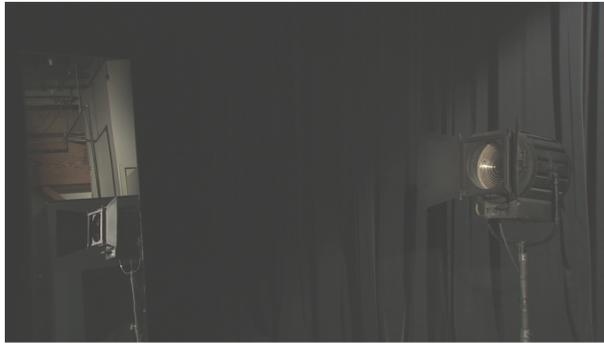
photography, a first in cinema history. Finally, he alludes to a new language within the medium of 3D cinema. In his keynote address at the 3D Flic conference in Toronto, 2011, Wenders refers to the period before production when he still was wishfully thinking and hoping to prove that there existed this language of 3D. Similar to my process, Wenders went about discovering his understanding tof stereo language through application. After watching *Pina* I have no doubt about the existence of 3D language. Dance is a language that unfolds in space. I've seen *Pina* several times and the illusion of proximity enhances the experience of what the dancers are trying to communicate. In my opinion, the physicality of the stereo experience significantly contributes to the emotional response of the audience. The research and final project are about discovering a style in dimensional films and uncovering the possibilities of this emergent stereo language with the help of my colleagues and collaborators.

The Language of Stereo Cinema and Experimental Methods

The studio exercises and experiments are an attempt to discover a voice in the language of 3D filmmaking. The terms for these practices are not easily articulated because a language addressing dimensional film has yet to be formulated, studied in depth or closely defined. There are filmmakers who very recently are contributing to this, within the mainstream, such as James Cameron, Wim Wenders, and Martin Scorcese. Artists like Phillippe Baylaucq and Josephine Derobe are also creating new work that is helping to shape new stereo conventions. For my purposes, the work of Baylaucq and Wenders have helped to contribute to a 3D language through their innovative use of technology and their experience of creating their first stereo films.

To claim there is no language of stereo is inaccurate. I know it exists, but let us say there's no dictionary yet. Though stereo has been around since the birth of film, coming in and out of fashion, there simply are not any seminal texts about stereo language. Ideas from 2D film theory can be applied in describing stereo film, but in regards to the effects exclusive to the stereo experience, little to no theory exists. This section is not about defining a specific language of stereo, but rather acknowledges the possibility of its existence and strives to participate in its creation. The reality of the extension of film language into a third dimension begs a number of questions. Primarily, how can depth be used to affect the observer's emotional response to a film? I can only speculate on the answer to this question. That being said, however, the studio-based experimental method that I describe looks for certain physical qualities to form a judgement on the type,

quality or effectiveness of a stereo shot. The research undertaken for this paper and my

studio practice explores stereo imaging technologies, but this has resulted in only a

limited stereo language relevant to my practice. The ultimate goal is to tease out new

meanings and relationships in the resulting stereo space through experimentation. This

remains a process-based approach that continues to consider the relationship between

the effects of older analog technologies and the new possibilities offered by emergent

digital technology.

A contemporary example of someone developing the language of stereo cinema is

Canadian filmmaker Phillippe Baylaucq, who directed a short stereoscopic film using

experimental military cameras never before used for cinema. The imagery in his film *ORA*

(2010) for the National Film Board (NFB) is unlike anything ever seen before. Baylaucq

uses high definition thermal imaging cameras, which unlike the majority of digital

cameras, capture heat instead of light. A unique element of *ORA* is the implementation of

a current military technology for uses in artistic production, as opposed to the 'trickle

down' integration process that happens after technology is released by the military. His

work is relevant to my exploration of the medium for its innovative use of technology,

but more importantly, for his approach to stereo filmmaking. When asked about writing

for an experimental stereo film of this kind, Baylaucq responded: "That's how José[55] and I

approached this project—doing tests with the thermal camera, workshopping with the

dancers. Obviously, there is no traditional script involved. We proceeded through our

findings and our discoveries. We did have a general structure that we refined over the

---

[55] José Navas is the choreographer for *ORA*.

course of our formal, technical and aesthetic research."[56] This experimental approach to filmmaking has a long history at the National Film Board, and it resonates strongly with my own practice, which can be found in the results of testing ideas in 3D space and watching for the visual sensibilities that arise when layering 3D imagery within 3D imagery.[57] In the image sequence provided on page 41, the camera pans slowly from an interior space to an exterior space where a figure appears draped in a cloth. The two spaces are match-moved with postproduction software, creating an unusual transition. Once the camera stops, a draped figure appears. Within the figure another space is superimposed, using a digital colour keying technique, creating another space within a space. The effect is not unpleasant, but unlikely, and has visceral implications for the viewer. More specifically, the space inside the space makes sense to a viewer only if it is set back behind the first layer. If separation between the images is increased, so that it exists in front of the object it is supposed to be behind, then an unsettling effect happens. This discovery could be harnessed for a number of different effects, depending on the situation. One example could be to use it to create tension or as a contemplative special effect. The process is ongoing and is shaping the form of the stereo video work for the thesis project. Reactions to findings and emerging themes and discoveries in the initial stages of production is based upon Shklovskii's method of looking for the unfamiliar while the film's structure emerges through practice, thus, referencing the processes used by both Baylaucq and Snow.

---

[56] *Press Kit. ORA A film by Phillippe Baylaucq,* National Film Board of Canada, Last modified Sept. 7, 2011. (NFB : Montreal, 2011), http://onf-nfb.gc.ca/medias/mediakit/orapresskit.pdf.

[57] Image sequence drawn from early camera tests for *Transference.* See Fig. 7.

Conclusion

To call this section a conclusion is a bit misleading. What I have concluded from this past twenty months of research and experimentation is that there is so much more exploring to do. The history of stereo is still to be properly written, and the theoretical implications of stereo upon our current visual culture are far reaching. I have only touched the surface of a massive pool of knowledge to be contextualized and explored. So many historical films exist that have yet to be rediscovered by the mainstream, and they could teach us more about what the original stereo filmmakers were thinking and doing. This paper is the first step in my personal discovery of the language of stereo cinema and art. The fundamental principles of how stereo exists within the structure of our global culture, even if only in a general sense, opens up avenues for discussion and research by myself and others.

In our current age of rapid globalization and technology development, Giorgio Agamben's ideas around the apparatus are particularly poignant, and his point of view sums up much of what I believe stereo is a part of:

> The boundless growth of apparatuses in our time corresponds to the
> equally extreme proliferation in processes of subjectification. This may
> produce the impression that in our time, the category of subjectivity is
> wavering and losing its consistency; but what is at stake, to be precise, is
> not an erasure or an overcoming, but rather a dissemination that pushes
> to the extreme the masquerade that has always accompanied every
> personal identity. [58]

---

[58] Giorgio Agamben. *What is an Apparatus? and Other Essays.* Ed. Werner Hamacher. Trans. David Kishik and Stefan Pedatella. (Stanford: Stanford University Press, 2009), 15.

This quote divulges the nature of media's effect on us humans as social beings. The ubiquitous adopting of every new technology into our daily lives has far-reaching effects. Digital stereoscopic media is another one of these technologies and its global implementation contributes to this masquerade. The processing of these images happens closer to the brain than ever. Stereo is an illusion, but understanding its origins and its contemporary place within our culture will make me a better Illusionist.

The studio experiments really are an adventure in stereo. To learn and understand how stereo works one must dive in and play with the tools and the principles. The first time one creates a stereo pair with a camera or a pencil and puts on those glasses to see the illusion of stereopsis at work is really a moment to relish. Stereo is an art form that is one step closer to the dream of embodying another person's experience or idea. I have embarked upon this adventure and I continue to experiment with the research and knowledge gained during my time at Emily Carr.

Bibliography

Agamben, Giorgio. *What is an Apparatus? and Other Essays.* Ed. Werner Hamacher. Trans. David Kishik and Stefan Pedatella. Stanford: Stanford University Press, 2009.

Andrews, Richard. "James Turrell: Knowing Light" *Curatorial Statement.* March 21, 2003 – February 8, 2004. Stroum Gallery. Last Updated March 21, 2003, http://www.henryart.org/exhibitions/show/205.

Bazin, André. "The Myth of Total Cinéma" *What is Cinéma?* Trans. Timothy Barnard. Montreal: Caboose, 2009.

Benjamin, Walter. The Arcades Project. Boston : Belknap Press, 2002.

Brougher, Kerry. *Hall of Mirrors: Art and Film Since 1945*. Ed Russell Ferguson. Los Angeles: The Museum of Contemporary Art of LA and Monticelli Press, 1996.

Crary, Jonathan. Suspensions of Perception: Attention, Spectacle, and Modern Culture. Boston: The MIT Press, 2001.

--, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century.* Cambridge: MIT Press, 1990.

Hayes, R.M. *3D Movies: A History and Filmography of Stereoscopic Cinema*. Jefferson, North Carolina: McFarland and Co. Inc., 1989.

Hoffman, D.M., Karasev. V.I. & Banks, M.S. "Temporal presentation protocols in stereoscopic displays: Flicker visibility, perceived motion, and perceived depth", *Journal of the SID*, 19/3, (2011): 255-281.

Kelly, Kevin. *What Technology Wants.* New York: Penguin, 2010.

Lipton, Lenny. *Foundations of the Stereoscopic Cinema. A Study in Depth*. Scarborough, Van Nostrand Reinhold Publishing, 1982.

Nash, Mark. "Between Cinema and a Hard Place: Dilemmas of The Moving Image as a Post-Medium." *Art of Projection*. Ed. Stan Douglas & Chris Eamons. Ostfildern: Hatje Cantz, 2009.

Ora. Press Kit. A film by Phillippe Baylaucq. National Film Board of Canada. Date of Publication: September 7, 2011. Montreal: National Film Board of Canada. Last updated September 7, 2011. http://onf-nfb.gc.ca/medias/mediakit/orapresskit.pdf

Pank, Bob ed., Quantel Digital Fact Book, CD ROM, 2008.

Rule, John T. and Bush, Vannevar. "Stereoscopic photography", *Handbook of Photography*,

ed. Henny and Dudley, Whittlesey House, 1939 quoted in Lenny Lipton, *Foundations of the Stereoscopic Cinema. A Study in Depth.* Scarborough, Van Nostrand Reinhold Publishing, 1982.

Shklovskii, Viktor. "Art as Technique". *Russian Formalist Criticism: Four Essays.* Trans. Lee T. Lemon. Lincoln: University of Nebraska Press, 1965.

Turim, Mareen Cheryn. *Abstraction in Avant-Garde Films,* Michigan: UMI Research Press, 1985.

Varela, Willie. "Canada's Multimedia Master: An E-Mail interview with Michael Snow." *Journal of Film and Video.* Vol. 57, No. 1/2. Spring/Summer, 2005.

Wenders, Wim. "Keynote Speech at the Toronto Stereoscopic 3D Conference." Personal Weblog of Wim Wenders. Last updated June 11, 2011. http://www.wim-wenders.com/archives/2011-06-Toronto-Keynote-Speech/toronto-keynote-speech.htm.

Zone, Ray. *3-D Filmakers: conversations with creators of stereoscopic motion pictures.* Lanham, Maryland: Scarecrow Press, 2005.

-- . *Stereoscopic Cinema and the Origins of 3D Film, 1838-1952.* Lexington, University of Kentucky Press, 2007.

Filmography and Art Works Cited

Avatar. Writ. / Dir. James Cameron, Twentieth Century Fox, 2009.

Cardiff, Janet and Miller, George, *Paradise Institute.* Ottawa: National Gallery of Canada, 2001.

La Région Centrale. Writ. / Dir. Michael Snow, 1971.

Ora. Writ. / Dir. Phillippe Baylaucq, 2011.

Pina. Writ. / Dir. Wim Wenders, 2011.

Turrell, James. *Milk Run III,* Washington DC: Smithsonian Institute, 2004.

Glossary of Terms[59]

Anaglyph: A type of stereoscopy in which the left eye and right eye images are separated by color filtering and then superimposed as a single image, rather than two separate images. Each eye sees only the required image through the use of complementary colored filters (e.g., red and green or red and cyan). Anaglyph glasses have been popular over the years for viewing 3D comics and some 3D films (particularly on VHS and DVD).

Convergence: In human eyesight, convergence is the ability of our eyes to divert optical axes horizontally in an inward direction. The convergence 'near point' is the closest point where it is still possible to perceive one image. In practice, the eyes can easily converge inward, although they risk going "cross-eyed," but eyes have much less ability to diverge outward, as it is something we are physically unable to do, and when looking at 3D images that have positive parallax beyond the individual human interocular, it can be very uncomfortable. Convergence is sometimes referred to as 'toeing in'. This simulates the eyes converging. to converge upon a depth point in the scene, either in front of, behind or at the screen plane. The 'convergence point' is where the axes of toed-in cameras align on the Z-axis. Convergence can be adjusted in post production by horizontal movement.

Depth budget: This is the maximum amount of 3D depth recommended to use in front and behind the physical display surface for a specific 3D display. If the depth budget is exceeded, then viewers will find it increasingly uncomfortable to view a stereoscopic image, and for larger values they will see a double image. The aim of defining a depth budget is to provide content creators a concept of the working volume they can use on each display.

Digital cinematography: Shooting movies with digital cameras – not film. This growing practice generally makes use of cameras designed specifically for the purpose. These differ from the television application in that the full range of brightness captured by the image sensors is offered at the output as raw data, allowing color grading, format

---

[59] Bob Pank ed. Quantel Digital Fact Book, CD ROM, 2008.

changes, etc., to be executed as a part of the digital intermediate process. Television cameras are designed to work live, and so they include front-end processing for gamma correction, setup for the required color look, and clipping to suit home viewing conditions. The first digital cinematography cameras were adapted from HDTV equipment with maximum image size of 1920 x 1080 and ran at 24P. The new generation is built for the cinematography market offering raw data output of wide exposure range images currently up to 4K size or slightly bigger (e.g., 4520 x 2540 for the Red One camera).

Inter-axial distance: The distance between the centers of the lenses of two recording cameras. A typical distance would be 63.5 mm (approximating average adult male eye spacing).

Inter-ocular distance: Often interchanged with inter-axial distance in circles of stereo production, Inter-Ocular refers to the distance between the eyes of the viewer. A standard measurement for a Caucasian adult male is 65mm.

Stereo beamsplitter: A stereo beamsplitter rig enables the use of two cameras simultaneously to create stereoscopic imagery. A beamsplitter is required when the inter-axial distance (see above) between the two cameras needs to be less than the width of the camera body itself. A beamsplitter consists of a 50/50 mirror arranged at a 45-degree angle from 2 cameras. One camera captures images off the mirror while the other captures through it. This enables a closer distance between the cameras, which in turn allows for greater versatility when shooting 3D. See Fig. 4

Z-axis: The Z-axis is the third axis in a geometric coordinate system. When used in reference to cinema and stereography it refers to the depth axis.

Fig. 9

Appendix 1: 3D Camera Projects

TLGLTP

Beginning in the fall semester of 2010, through the summer of 2011, I documented a local band in 3D during several of their performances. I used the Fuji W3 camera. Because of the low cost of these cameras and access to five of them, I invited others to help me shoot the first show. By having others capture video from various vantage points, I could get multiple camera angles and alternative perspectives on the experience of shooting 3D from a professional director of photography, three still photographers and one amateur photographer. The original idea was to shoot with multiple cameras and play with the variety of angles during the editing process. After the near failure of the first shoot, I realized that a focus on the basics of stereography, based on the limitations of the W3, was needed to continue the project. Less than 10% of the material was usable for reasons attributed to the wide inter-axial of the camera; however the results from

the range of shooters, including myself did cover a cross section of do's and don'ts. The

second shoot was much better and afforded better results. A third and final shoot

captured any remaining material necessary to complete a short three-minute document

of the experiment.

There were several major lessons learned through production of this document. A huge

milestone was how to process two streams of material and edit 3D video. Most of the

software and plugins at the time were buggy and slowed down the process. In the end,

the principles of 3D post workflow and screen percentages became clear, and my results

became repeatable and, more importantly, watchable. Distance to the subject and to the

furthest point (depth budget), benefits and challenges of shooting in high contrast

situations, and when you can push beyond a typical 3% screen percentage[60] in post were

three major lessons in understanding 3D production through this experiment.

Coupled with the technical lessons was the process of identifying the roughened areas,

where the stereo effects really stood out and added to the experience of the scene. The

exercise went beyond depicting a band playing and into translating an experience. One

successful element of the video is the depiction of the space. 3D is ideal for performance

films, such as Wim Wenders' *Pina* (2011) or the IMAX film *U23D* (2007) which inspired

Wenders to shoot *Pina* in 3D, both exemplify. The illusion of stereopsis adds a visceral

quality to the moving image. This physicality contributes to the tone. The video depicts

---

[60] A standard safe amount of separations between each channel of video. *John Cassy*, Sky, *Sky 3D Commissioning & Production. A Note from John Cassy, 3D Channel Head,* Last Updated 2012, http://www.sky.com/shop/tv/3d/producing3d.

the band dressed in spacesuits and covered in glitter. The video is joyful and playful and the spatialization seems to heighten this sense through a more physical connection to the relationships on screen.

Side-by-Side Rig with a Green Screen

In the fall of 2010, I conducted a one-day experiment which influenced the trajectory of the final project. Armed with a small side-by-side rig, I embarked on a search for

Fig. 10

locations to shoot the test. The subject was a woman in a red dress carrying a green screen. The original concept was to create a space within the original stereo space by keying out the green in the image. This original test would be the basis for many of the other studio experiments during the MAA. The results from the day were striking. Several elements stuck out after the analysis of the material. As locations go, green

spaces with a range of contrast in lighting are ideal for 3D. The multitude of depth cues encourages the viewer to move around in the space.

The drapery (green screen) was an element that resonated well. It guided the eye through the space. In these tests, the woman in the frame was dragging, carrying and handling the bunched-up drapery. After watching and determining that the cloth worked as a formal element in the stereo space, it was necessary to attempt to key out the green and supplant a space within that space. The attempts to key out the green from video revealed that some further testing of concept was necessary. There was a problem getting a clean key due to lighting of the green screen and compression issues from the consumer camcorders used for this experiment. Some rudimentary proof of concept results demonstrated that this idea needed further investigation.

ChaCha Pixilation

The final experiment included in this paper was the ChaCha Pixelation test. ChaCha stands for a one-camera stereo production technique. Named after the dance, the first step is to take a picture and the following step is to take a second picture of the same subject by moving the camera slightly to the right or left. Using a motorized stereoscopic slider designed by the animation software company Dragonframe, I photographed a scenario using this technique. Pixilation is a technique of stop motion filmmaking using real people. To achieve this technique in stereo the actor must hold still for both photographs.

Fig. 11

The experiment took place on location under a local bridge. I had an assistant hold

up a large white card behind the actor so I could cut out the actor for each frame.

In retrospect, a green key, not a white card, would have been a better choice. The

white card caused colour aberrations in the digital image. The result was tedious

hours of manually rotoscoping each frame out, both the left and right channels, to

maintain the quality of the image. The original intention of the work was to make a

pixilated animation. During the process of production, a multi-layered stereo

portrait emerged. The piece morphed during the progress into a still stereoscopic

image. The idea functioned much better as a finished portrait than a test

animation. Also, during the process of critique some other elements emerged,

mistakes that offered interesting possibilities for further exploration. When looking

at the subject of the portrait in anaglyph, because each left/right pair of the actor

was individually cropped and composited into the image, he seems to float just off

the ground. This uncanny effect takes an otherwise serious looking portrait of a

man and adds another dimension of levity and personality once the viewer enters

the stereo space. Further experiments are being conducted with this method.

There is a possibility that some stereo pixilation will be incorporated into the final

project.

Fig. 12

Appendix 2: Whizard Projects

The *Whizard* Project is made up of three prototype systems: 1) *Whizard Motion,* moves a camera through motorized motion control; 2) *Whizard Strap On,* places a camera on the body for use during stunts; and *3) 360˚ Rig,* moves a single camera in a 360˚ motion to capture stereo video. Each one of these projects represents the development of experimental techniques for shooting unique and innovative video.

Whizard Projects: *Whizard Motion*

During the summer of 2010, just prior to the beginning of the MAA, development of a low-cost, time-lapse photography system began. The system was later dubbed *Whizard Motion* and was a result of a collaboration between myself and Kris Fortune. We received

a small budget from a short documentary to be shot in the outback of Australia. The small budget and mobile requirements of the system provided the parameters of the project. We asked the question: Can we develop a mobile three-axis time-lapse dolly for a budget of $1200 in under a month? When disassembled, the rig was to fit into a 1'x1'x3' soft case for travel. The system needed to run on battery power and have three axes of motion. The development time for this project was limited to less than a month. In order to expedite the process we decided on a low-cost pan/tilt telescope head used by time-lapse enthusiasts on the Internet. For the dolly, a geared rotary table with a cable drive was used to pull the cart. The version one (V-1) prototype went to Australia and was used with some success. During the first semester of the program, a more precise and reliable pan/tilt head replaced the telescope head. The new head is much easier to interface with than before and the redesign of the dolly from a track to a single rail greatly simplified the V-2 system. The system is currently functional and has been tested by external users. Some software changes were implemented based on user requests and V-3 will be realized in summer 2012.

Whizard Motion was a purely technical endeavor; an applied research project to create a motion control time-lapse system based on a given set of parameters. The process was an exciting opportunity to create a tool that would definitely influence future video work. Alongside the development of this tool, stereo experiments were taking place in order to understand how the system could be integrated for stereo use.

Whizard Projects: Whizard Strap On

After the first semester, I embarked on the development cycle of a second piece of camera support gear which eventually was dubbed *The Strap On.* The system had no motors or electronics. The challenge this time was to create a stunt camera support that

Fig. 13

would stabilize a camera mounted to a person for use in a film. The mount needed to hold a digital single lens reflex (DSLR) camera in a fixed position close to the actor's chest. The mounting plate was fabricated out of aluminum and encased in a malleable but strong plastic that was salvaged from an old pelican case. There were clips attached to the plate that could then be attached to the actor wearing a jerk-suit[61] vest. After learning how to sew, the vest was modified with heavy-duty strapping and plastic clips. The camera mount was positionable up and down along a central channel on the mounting plate, and upon that were placed several different attachments: a pan/tilt head plate, a standard quick release plate, and a *ninja mount.* The *ninja mount* enabled the

---

[61] A jerk-suit is a customized tightly fitting vest for use by stunt persons during wire work.

Strap On to be worn under the clothes. The purpose was to simulate that the camera was simply worn around the actor's neck by a strap, when it was actually tied down to the mount poking out through the costume. This was useful if the scene had multiple camera angles and the actor would otherwise be seen with the camera. The *Whizard Strap On* was a huge success and was even used for a skydiving stunt. This success can be measured by no damage to the camera (due to the rig breaking) and the amount of stabilization offered by the system to the end picture.

In order to understand how the chest rig would fit into my final project, I tested it in several situations with a GoPro Hero 3D[62] system. The *Strap On* was worn while mountain biking, skateboarding, cycling, and running, which resulted in varying degrees of success. After reviewing the footage I came across several interesting angles, but none that seemed appropriate for the final project's concept. The vest, most likely, will not be used as part of the final project. The review of the development and testing of the rig is worth mentioning here because it is part of my prototyping practice, and because of its success by, and the continued use of other artists interested in its potential.

Whizard Projects: *360˙ Rig*

The 360 Rig was an explicitly stereo focused experiment, based on an idea I had heard about. The stereo illusion needs two images, one for each eye, and that image needs to originate from a fairly close position to the first image's point of origin. For example, imagine two video cameras side by side. The subject for this experiment is fairly still. The

---

[62] Go Pro Hero is a small light-weight high impact HD camera for use in high impact areas.

Fig. 14

shutters of these cameras fire at almost the same moment (at least 1/24 of a second

apart). This would result in a stereo pair of videos. A single rotating camera can provide a

similar sequence of stereo pairs. The camera rotates on an arm in a 10ft radius around a

subject sitting in the center. If the image is duplicated and offset by one frame, you now

have a stereo pair of videos. Because the camera is moving laterally in space, each frame

is slightly offset from the last. The subject is fairly still, therefore no difference can be

detected through evidence of motion blur or other artifacts.

The 360 Rig experiment met with limited success, and the final music video that

emerged from the shoot was a static shot; it did not utilize any of the 360˚ camera

moves. Upon further observations, the vertical movement in the camera, as it bobbed

slightly up and down during rotation, caused vertical misalignment in the stereo image,

rendering the 3D unwatchable. With tedious manual tracking of the vertical movements, some material was salvaged as a proof of concept, but because of the time consuming nature of the tracking, the 360 Rig needs to be modified and tested again.

The series of *Whizard* projects and developing prototype systems were technical endeavors. While rapid prototyping is a significant part of my practice it is only one aspect. I also create videos. My method in this MAA has been focused on new techniques of image production towards a comprehensive understanding of stereoscopic video. Alongside the technical development are the 3D camera projects. This collection of short projects is geared toward practice-based learning concentrating on how to shoot 3D. I applied a trial and error method to begin with. The method was to start shooting with low quality fixed interaxial cameras, learn the post workflow and review the material in 3D. This method proved successful and led to an understanding of the principles of stereography. The iteration of these principles is beyond the scope of this paper. For brevity I will list the primary factors learned about stereography: effects of interaxial distance on depth budget, framing and scale; when and when not to converge; consequences of lighting on a stereo scene; moving vs. stationary camera; the principle of screen percentages, and the zen of 3D rig alignment. Each of these factors could be expanded upon; however, I feel I have a solid grasp upon these principles, enough to apply them intuitively in practice.

Appendix 3: *Transference*:

Selected Story Boards and Treatment

1. Exterior, Forest/Seawall, day :

Going through a forest we find a long train of cloth floating through the trees.

2. Exterior Seawall, day :

We follow the floating train to a seawall, where see a mysterious woman. We try to catch up with her, but she keeps walking away. We follow her until finally we do catch up with her. We try to get ahead of her, to try to and see her face, to look into her eyes, but she keeps turning away from us. She eludes us finally by running towards the forest.

3. Exterior, Forest, day :

We are transported with her into the forest. She continues to elude us. She runs through a grove of trees into an opening. We try to keep up with her. We see her body moving, but we cannot see the front of her face. When we catch up to her again, we find her holding on to the end of the long trail of cloth, which is caught up in some trees.

4. Interior, Bedroom, evening :

We are transported into a hallway, just outside a bedroom. Several inserts of a disheveled room. We move back away from the door, down a long hallway. A flash of red light from the room and the door slams shut.

Fade to black.

5. Exterior, Seawall, night :

It is night and we're back on the seawall. We watch the woman smoking, sitting on a bench beneath a street lamp. It looks like she is moving in slow motion.

We move towards her slowly. She flicks her cigarette out into the ocean. We follow it's arc. When we turn back to where she was sitting, she is gone. The streetlight goes out.

Fade to black.

6. Interior, Memory Space, timeless :

We are in a dark space. We see the woman. She acts distressed. It looks like she is arguing with someone, but we can't see who.

7. Exterior, Forest, evening (magic hour?) :

We are transported back into the forest. We see the woman holding onto the cloth caught up in the trees. She pulls on it with both hands, releasing it from the trees. She watches the cloth fall in slow motion until it lies on the ground, crumpled, tattered, dirty. Then she turns at last to us, but her face is blank, her eyes are unhappy. She holds our gaze only for a moment, then she turns and walks away.
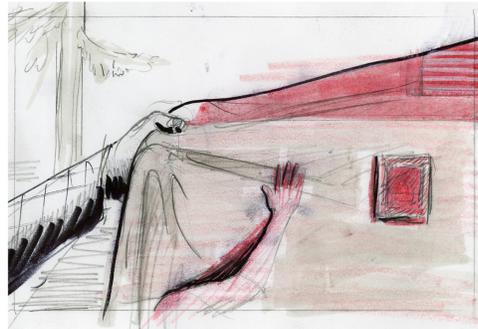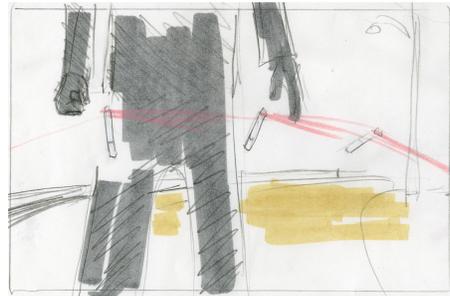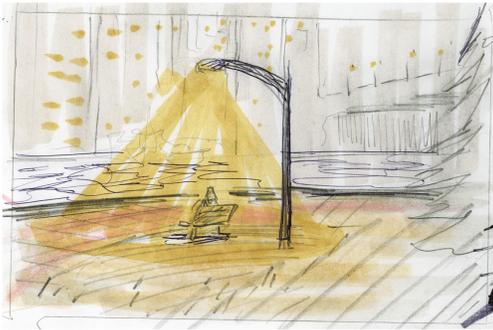
Fade out

Fig. 15

Fig 15 cont.