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"Fake 3D," Real Work: Rethinking the Creative Labor and Cultural Perception of 3D Conversion

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“Fake 3D,” Real Work:

Rethinking the Creative Labor and Cultural Perception of 3D Conversion

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Film and Television

by

Todd Shiga Kushigemachi

2020

ABSTRACT OF THE DISSERTATION

"Fake 3D," Real Work:

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Doctor of Philosophy in Film and Television

University of California, Los Angeles, 2020

Professor John T. Caldwell, Chair

From 2010 to 2019, the Hollywood studios consistently released 3D conversions of their biggest 2D blockbusters for both domestic and international markets. Yet, despite this continued prominence, the scholarly field of cinema and media studies has largely neglected this industrial and creative practice. Building on production studies methods and research frameworks, this dissertation addresses this blind spot by rethinking 3D conversion as an industrial interpretive act and as a cultural phenomenon, one that inspired debates among industry professionals, film critics, and audiences about how they understand cinema as (not) art. To date, existing scholarship on 3D cinema has focused almost exclusively on filmmakers using 3D cameras, also known as native 3D. Consequently, media scholars have unwittingly perpetuated the biases of popular and industrial critical discourse, which habitually favors native 3D as more creatively legitimate than converted 3D. My research deconstructs such hierarchies and assumptions to

more clearly understand 3D conversion—both the labor involved in its processes and the aesthetic principles that guide the conversion. Alternately, I argue that the three main conversion companies—DNEG (formerly two companies, Gener8 and Prime Focus), Legend3D, and Stereo D—do not simply add depth cues to 2D footage. Rather, 3D conversion professionals closely study 2D film images to produce a parallel text in a process I call creative interpretation.

This research builds on original interviews conducted with key executives, co-founders, and/or supervisors representing the Big Three conversion companies. The project situates these findings within larger historical and contemporaneous discourses to highlight how professionals' explanations both directly and indirectly participate in public debates about the cultural legitimacy of their craft. Further, the structure of this dissertation highlights how the cultural perception of 3D conversion exists at the intersection of multiple assumptions about cinematic legitimacy, specifically those concerning 3D as spectacle, reformatted texts as aberrations, and digital technologies as antithetical to cinema's analog roots. By considering and then problematizing these perspectives, I hope to not only uncover the complex cultural dimensions of 3D conversion but also propose new paths for research on professionals who reformat films in a multiplatform media ecosystem.

The dissertation of Todd Shiga Kushigemachi is approved.

Jennifer Holt

Denise R. Mann

Ellen Scott

John T. Caldwell, Committee Chair

University of California, Los Angeles

2020

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Acknowledgements

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I would also like to thank the other members of my committee for their mentorship and for their careful consideration of my work these past few years. I was always stunned by the speed of Denise Mann's responses to my email inquiries, as well as the level of attention and detail she could pack into those rapid responses. I am deeply grateful that Jennifer Holt has been a part of this committee, whether that meant emailing and video calling from Santa Barbara or driving all the way down to Los Angeles for my prospectus defense. Ellen Scott provided valuable feedback for this project, with both her far-reaching perspective as a classical Hollywood historian and her natural sense of how to critically engage with secondary sources. I especially want to acknowledge how much I appreciate my committee's dedication to this project in the midst of a very difficult time. I file this dissertation in Spring 2020, in the midst of the COVID-19 pandemic. That is, my committee thoroughly engaged with my project during Los Angeles County's "safer-at-home" directive to slow the spread of the novel coronavirus. All of them had to adjust to researching, teaching, and/or taking care of administrative tasks from

home, not to mention the many other anxieties and worries that mark this time of grave uncertainty. I know it could not have been easy, so honestly, I cannot thank them enough.

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As wonderful as the professors have been, the UCLA Cinema and Media Studies program would not have been the experience it was without my fellow graduate students. I felt a strong sense of community that was crucial to my getting through this program, whether help came in the form of specific academic advice, moral support, or simply good laughs during tremendously stressful times. I am grateful that I had a tightknit cohort of such friendly and intelligent colleagues: Lindsay Affleck, Lauren Boumaroun, Jessica DePrest, Mohannad Ghawanmeh, and Adrien Sebro. We workshopped the hell out of each other's work, we came out the other end stronger, and I have learned so much from all of them. There are so many other people at UCLA, past and present, who have been a crucial part of this experience: James Fleury, Dawn Fratini, Jason Gendler, Kevin Hall, Grace Jung, Maja Manojlovic, Oscar Moralde, Brittany Murphy, Jennifer Porst, Ben Sampson, Ben Raphael Sher, Leah Steuer, Saundarya

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Education

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Introduction

Call it a *Clash* and burn. On February 2, 2010, Warner Bros. announced that it would convert its upcoming *Clash of the Titans* remake into 3D, despite the film having been conceived and shot as a two-dimensional blockbuster. Fox's *Avatar*, shot with 3D cameras and released on December 18, 2009, had proven a major critical and commercial success, so naturally, other studios wanted to capitalize on the perceived demand for 3D with their own big-budget features, even those not originally planned for 3D. A *Daily Variety* report on the *Clash of the Titans* announcement foreshadowed the coming industrial and cultural debates over 2D-to-3D conversion. The article laid out anxieties about the tension between a labor-intensive conversion process and a limited timeframe, a key talking point for 3D skeptics and fans alike.[1]

The India-based visual effects and post-production vendor Prime Focus converted the film in approximately 10 weeks, requiring a work pace that *Daily Variety* characterized as "faster than most in the field would be comfortable with." Tim Sassoon of conversion company Sassoon Filmworks expressed his reservations about whether Prime Focus would be able to pull off the job. He said doing the conversion job in the time allotted was "a tall order for anyone, especially for a company that's never done this before."[2] Even before *Clash of the Titans* would be released in both 2D and 3D on April 2, there was doubt whether the individuals tasked with converting the film would be able to pull it off.[3]

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[1] David S. Cohen and Dave McNary, "WB's on 3D fast track," *Daily Variety*, February 3, 2010.

[2] Cohen and McNary, "WB's on 3D fast track."

[3] In this dissertation, I characterize 2D-to-3D conversions as parallel texts, a concept which I will detail in Chapter 2. Coincidentally, Antonio Sanna has referred to the 2010 *Clash of the Titans* as a "parallel remake" in relation to Greek myth and the 1981 *Clash of the Titans*. Sanna explores questions of adaptation, and as I will briefly explore later, my conceptualization of parallel textuality differs from more traditional understandings of adaptation in

Prime Focus's conversion of *Clash of the Titans* did solid business at the box office. According to Box Office Mojo, 3D screenings accounted for 52 percent of the $61.2 million opening weekend total, with approximately $10 million attributable to just to the 3D surcharge.[4] Despite the financial rewards, the 2D-to-3D conversion was widely considered a technical and creative failure. Perhaps 3D's most prominent anti-fan, Roger Ebert specifically panned the 3D conversion in his otherwise positive 3-star review. Ebert cynically noted the 3D's potential boost to the bottom line in his criticism: "Explain to kids that the movie was not filmed in 3-D and is only being shown in 3-D in order to charge you an extra $5 a ticket. I saw it in 2-D, and let me tell you, it looked terrific. Split the difference: 'We see it in 2-D, I save five bucks, and I increase your allowance by $2.50 this week.'"[5] The jab encapsulates two interrelated elements that would make 3D conversion so suspect: post-production conversion's apparent lack of artistic intention, and the studios' financial opportunism.

The furor over *Clash of the Titans*'s 3D, however, would go far beyond the film's opening weekend reviews. The film became the prototypical example for everything wrong with 2D-to-3D conversion. Weeks after the film's release, *Geek Tyrant*'s Joey Paur exclaimed, "Just stop with the 3D conversions already! 3D conversions suck, didn't the studios learn already from how bad the *Clash of the Titans* 3D conversion was?"[6] Years later, in 2014, *Cinema Blend*'s Kristy Puchko qualified that Stereo D's conversion for *Need for Speed* was actually quite good,

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important ways. Antonio Sanna, "Reinterpreting Myth and Film: *Clash of the Titans* as a Parallel Remake," *Kinema* (Fall 2015), https://openjournals.uwaterloo.ca/index.php/kinema/issue/view/311.

[4] Brandon Gray, "Weekend Report: Kraken Gets Crackin' Over Easter," *Box Office Mojo*, April 5, 2010, http://www.boxofficemojo.com/news/?id=2704.

[5] Roger Ebert, *Clash of the Titans* review, March 31, 2010, http://www.rogerebert.com/reviews/clash-of-the-titans-2010.

[6] Joey Paur, "The Green Hornet and The Last Airbender Getting Crappy 3D Conversions," *Geek Tyrant*, April 23, 2010, http://geektyrant.com/news/2010/4/23/the-green-hornet-and-the-last-airbender-getting-crappy-3d-co.html.

despite the fact that "often, a post-convert of this nature signals a late in-the-game decision to go 3D, which can result in catastrophes of *Clash of the Titans* and *The Last Airbender* proportions."[7] These two films, released within three months of each other, were emblematic of a larger suspicion about 3D conversion; these stereoscopic versions are commercially but not creatively motivated, seemingly rushed as an afterthought. Puchko's qualification that *Need for Speed* is pretty good for a conversion reaffirms the cultural common sense that opposes "real" 3D shot with special cameras to "fake" 3D converted in post-production.

Despite this widespread perception of *Clash of the Titans* as a failure by 3D critics, the most damning takedown of the 2D-to-3D conversion would come from none other than *Clash of the Titans* director Louis Leterrier. In 2013, then promoting his non-3D film *Now You See Me*, Leterrier discussed the 3D conversion of his previous film with *The Huffington Post*: "It was famously rushed and famously horrible. It was absolutely horrible, the 3D. Nothing was working, it was just a gimmick to steal money from the audience. I'm a good boy and I rolled with the punches and everything, but it's not my movie. *Clash of the Titans* is not my movie. And ultimately that's why I didn't do the sequel."[8] This quote affirms the themes present in criticisms of 2D-to-3D conversion since it became a part of Hollywood filmmaking. It is a corporate scheme to make more money, it is a rushed process, and it is not the product of the director's vision for the film.

As this debate about the technical or aesthetic legitimacy of 3D conversion raged on, thousands of creative workers at 3D companies continued to convert Hollywood blockbusters,

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[7] Kristy Puchko, "To 3D Or Not To 3D: Buy The Right Need For Speed Ticket," *Cinema Blend*, March 13, 2014, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Need-Speed-Ticket-41996.html.

[8] Mike Ryan, "Louis Leterrier, 'Now You See Me' Director, On The Problems With 'The Incredible Hulk' And 'Clash Of The Titans'," *The Huffington Post*, May 28, 2013, http://www.huffingtonpost.com/2013/05/28/louis-leterrier-now-you-see-me_n_3333311.html.

and this method of stereoscopic filmmaking remains a central element of commercial U.S. filmmaking to this day. Many have weighed in on 3D conversion, but few have taken the steps to understand what the process actually entails. This dissertation seeks in part to address this blind spot by exploring the industrial and creative practice of 2D-to-3D conversion. To date, existing scholarship on 3D cinema has focused almost exclusively on filmmakers using 3D cameras. Consequently, media scholars have implicitly perpetuated the biases of popular and industrial critical discourse, which opposes native 3D and converted 3D. Such cultural hierarchies of aesthetic value ultimately contribute to the erasure of the creative labor required by the 3D conversion process.[9] My research deconstructs such hierarchies and assumptions to more clearly understand 3D conversion—both the labor involved in its processes and the aesthetic principles that guide the conversion. I alternately conceptualize 3D conversion as a serious engagement with film form and, in doing so, I position conversion practitioners' textual analysis of films originally shot in 2D not only as a production practice but also as a creative act. With transnational work forces primarily based in Canada, India, the United Kingdom, and the United States, the three main conversion companies—DNEG (formerly two companies, Gener8 and Prime Focus), Legend3D, and Stereo D—do not simply add depth cues to 2D footage. Rather, conversion practitioners closely study 2D film images to produce a parallel but distinct 3D text in a process I call *creative interpretation*. But ironically, the unique work of creative interpretation is precisely what contributes to the invisibility of these companies and their work. As suggested by my consideration of creative labor, popular perception, and aesthetics, this

[9] I use "2D-to-3D conversion" and "3D conversion" interchangeably throughout, as practitioners use both of these terms. Vicki Mayer's research on below-the-line labor informs how I use the term "creative labor." Mayer conceptualizes creativity in a manner that challenges traditional notions of authorship and artistic value. In particular, she argues that creativity can be embedded in seemingly "non-creative" work, such as the assembly of television sets in Brazil. For more, see Vicki Mayer, *Below the Line: Producers and Production Studies in the New Television Economy* (Durham: Duke University Press, 2011).

project is not just about technologies or technical processes; instead, this work intends to untangle the various discourses surrounding 3D conversion as positions in a cultural debate informed by how we understand and value cinema and its practitioners.[10]

My dissertation analyzes the specifics of conversion practitioners' creative labor to problematize the discursive binary between native 3D shot with stereoscopic cameras and the conversion of 2D to 3D in post-production.[11] For native 3D, filmmakers shoot the action using two side-by-side cameras, one for each eye.[12] For 3D conversions, filmmakers use traditional 2D cameras on set, with 3D conversion company workers adding depth in post-production. According to many professional and amateur film critics, these two approaches represent two completely different levels of technical and aesthetic credibility. For example, the regularly updated website *Real 3D or Fake 3D* reports which films were shot in native 3D ("real") and which were converted ("fake"). This particular site associates native 3D with creative intent and converted 3D with commercial opportunism. My research counters this binary by more carefully considering the specific processes and workflows of 3D conversion, which suggest that the relationship between native and converted 3D is much more complex. Indeed, the creative laborers of conversion companies often convert select 2D footage from films primarily shot using 3D cameras to correct mistakes in image capture and solve technical problems that cannot

[10] For more technical discussions of stereoscopic cinema, see Lenny Lipton, *Foundations of the Stereoscopic Cinema: A Study in Depth* (New York: Van Nostrand Reinhold Company, 1982); Rémi Ronfard and Gabriel Taubin, eds., *Image and Geometry Processing for 3-D Cinematography* (Berlin: Springer, 2010).

[11] "Stereoscopy" refers to general process of using two images, offering slightly different angles and with one for each eye, to create the illusion of depth. Throughout my prospectus, I use "3D" and "stereoscopic" interchangeably to describe three-dimensional films and related creative practices.

[12] Some native 3D systems position the two cameras perpendicular to each other, with mirrors and prisms used to capture the two distinct left and right eye images, but the general principle remains the same. These mirror systems allow the two cameras to reduce the interocular distance—the distance between the left and right eye images.

be solved on set.[13] Further, my research seeks to understand how practitioners rationalize their creative labor when their work is largely dismissed as illegitimate and superfluous. By detailing alternate (arguably more favorable) conceptualizations of 3D conversion, I do not merely intend to argue that conversion critics or the site *Real 3D or Fake 3D* are somehow objectively wrong. Instead, I engage these varying perspectives to emphasize the cultural contingency of how different communities understand production processes, with criticism and conversation producing and managing knowledge.

This dissertation limits its focus to U.S. live-action narrative features that have been wholly or in part converted into 3D during the period from 2010 to 2019. In 2010, the major studios released two of their first full-length 3D conversions, Sony Pictures Imageworks and Legend3D's *Alice in Wonderland* and Prime Focus's *Clash of the Titans*.[14] Although I will reference live-action films shot exclusively in native 3D for comparative and contextual purposes, they will not be my focus. Further, my parameters largely exclude 3D computer-animated movies and 3D documentaries, except for when discussing in relation to broader cultural debates about 3D cinema. Miriam Ross's *3D Cinema: Optical Illusions and Tactile Experiences* exemplifies how scholarship can engage various types and genres of stereoscopic films simultaneously, but my interest in 3D conversion as a production practice necessitates

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[13] For example, the press lauded Michael Bay for using 3D cameras to shoot *Transformers: Dark of the Moon* (2011), but in truth, Legend3D did conversion work on approximately 78 minutes of the 154-minute finished film. Peter Sciretta, "Michael Bay Shooting Transformers 3 with 3D Cameras," *SlashFilm*, July 2, 2010, http://www.slashfilm.com/michael-bay-shooting-transformers-3-with-3d-cameras/. For a news story on the 3D conversion printed *after* the film's release, see "Biz crosses blurry line on 'true 3D,'" *Variety*, July 19, 2011, http://variety.com/2011/digital/news/biz-crosses-blurry-line-on-true-3d-1118040081/.

[14] Disney's *G-Force* (2009), with 3D by In-Three and Sony Imageworks, preceded these two films. I do not include *G-Force* in my primary periodization because the film was not converted by the main companies included in this study. More importantly, because its release preceded that of *Avatar*, *G-Force* did not figure in the broader industry narrative about studios rushing to capitalize on the success of James Cameron's film. On a more technical level, Sony's Rob Engle has also talked about *G-Force* as a "hybrid film where you are switching back between conversion and renders." Ray Zone, *3D Revolution: The History of Modern Stereoscopic Cinema* (Lexington: University Press of Kentucky, 2012), 385.

primary and close consideration of immediate industrial, cultural, and aesthetic frameworks.[15] That is, 3D animated and documentary films might share general aesthetic concerns with the live-action narrative 3D conversions in my dissertation, but they represent different modes of production and thus necessitate different questions regarding creative labor.[16]

My research is situated at the intersection of studies on production, cultural status, and film aesthetics.[17] I see these three as deeply interrelated in the discourses surrounding 3D conversion. On the one hand, while a dissertation solely focused on production might offer a richer sense of what 3D conversion labor entails, such a study might miss how the 3D films themselves function as sites of contestation and negotiation between art and industry economics, and between 2D and 3D film form. On the other hand, approaches strictly concerned with hierarchies of value related to taste often elide institutional and economic contexts, and they also tend to rely on essentialist understandings of the relationship between viewer and text.[18] Moreover, and problematically, aesthetic approaches that are primarily text-based might reify a particular version of a text as the "original" text. In contrast, my project suggests that 3D conversion actually destabilizes our understanding of media texts as either original or singular.

Indeed, I characterize 2D-to-3D conversions as *parallel texts* so as to clarify their

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[15] Miriam Ross, *3D Cinema: Optical Illusions and Tactile Experiences* (London: Palgrave Macmillan, 2015).

[16] With rare exceptions, such as DNEG's work on *The Addams Family* (cr., 2019), 3D conversion companies do not work on animated films. Instead, animation studios digitally render stereoscopic cameras to "film" the three-dimensional worlds built through computers. Thus, the website *Real 3D or Fake 3D* has characterized animated 3D as "real 3D," with both left- and right-eye cameras at the (animated) "site" of production. Given the ubiquity of such a process, there have not been popular debates about the technological means used to create stereoscopic images for animated films.

[17] I borrow the term "cultural status" from Michael Z. Newman and Elana Levine, whose work influences how I think through questions of aesthetic value and taste. Michael Z. Newman and Elana Levine, *Legitimating Television: Media Convergence and Cultural Status* (New York: Routledge, 2012).

[18] For a critique of how scholarship on taste has inhibited studies of television aesthetics, see Jason Mittell, "Evaluation," in *Complex TV: The Poetics of Contemporary Television Storytelling* (New York: New York University Press, 2015), 206-232.

relationship to other practices that also challenge the critical and aesthetic value placed on an "original" and its director-author.[19] Most scholars and cinephiles would consider what I call parallel texts to be mere enhancements or abridgements of what is generally accepted as the "original" or "official" version of the text. Aesthetic purists might characterize 3D conversions, along with colorized black-and-white films or pan-and-scan VHS tapes, as superfluous and threatening. (Why convert *The Wizard of Oz* into 3D? What if someone is first introduced to *The Wizard of Oz* as a 3D film?) Adaptations, sequels, and derivative paratexts such as online content are also met with critical skepticism for their supposed lack of originality and commercial opportunism, but parallel texts inspire specific questions concerning both creativity and film form.[20] In this regard, 2D-to-3D conversion is a specific instance of the labor and aesthetics of what might otherwise be considered the "reformatted" movie.[21] Moreover, by examining the creative labor of 3D conversion practitioners, I also complicate directorial claims to a singular creative vision and suggest the aesthetics of a converted 3D film to be the result of the negotiation of different practitioners' (sometimes contradictory) contributions.

To thoroughly explore these complex issues of cultural status, authorship, and originality, I spend much of this dissertation focused not only on 2D-to-3D conversion but on relevant

[19] Other scholars have used the term "parallel text" to describe different phenomenon. Martin Luginbühl writes about "traditional parallel text analysis" in which "texts are compared that belong to the same genre (i.e. similar topic, similar communicative situation, similar textual functions, similar forms), but come from two countries with different languages." In another context, Harvard's Geoffrey Chaucer Website defines "parallel-text editions" in literature as those that present "multiple versions of a text side-by-side." The latter is closer to how I use the term, as this definition recognizes how a particular work often exists in multiple versions. Martin Luginbühl, "What defines news culture?: Insights from multifactorial parallel text analysis," in *Contrastive Media Analysis*, ed. Stefan Hauser and Martin Luginbühl (Amsterdam: John Benjamins Publishing Company, 2012), 201-218; "Types of Editions," Harvard's Geoffrey Chaucer Website, accessed April 15, 2020, https://chaucer.fas.harvard.edu/types-editions.

[20] I borrow the concept of paratextuality from Jonathan Gray, *Show Sold Separately: Promos, Spoilers, and Other Media Paratexts* (New York: New York University Press, 2010).

[21] My use of "reformatting" is inspired by VHS tape disclaimers for widescreen films presented with a 4:3 aspect ratio: "This film has been modified from its original version. It has been formatted to fit this screen."

historical, cultural, and theoretical contexts that I see as fundamental to popular understandings of converted 3D as a bad object. As I will elaborate in my chapter breakdown, the organizing principle for each chapter is a specific vector of 3D conversion's cultural perception.[22] I see 3D conversion as existing at the intersection of cultural discourses about 3D as spectacle, reformatted texts as aberrations, and digital technologies as antithetical to cinema's analog roots. It is not uncommon for scholars to take genealogical approaches in exploring misunderstood aspects of media technologies, as demonstrated by the work of Lev Manovich, Thomas Elsaesser, and Kristen Whissel.[23] Most notably, media archeology has focused on "the media's past(s) in relation to the present," often to "construct alternate histories of suppressed, neglected, and forgotten media."[24] While not a work of media archeology (particularly given my interest in dominant narratives of well-known technologies), this dissertation also connects past and present, less to make arguments about the technologies themselves and more to illuminate how

[22] I use the term "culture" here to evoke scholarly traditions of *cultural studies* in research on production, television, and, more generally, individuals' and communities' processes of negotiating the value and meanings in and of media. Nick Jones also discusses "cultural contexts" in his 2020 book on 3D but, in doing so, invokes theoretical conceptions of *visual culture*: "We cannot truly understand digital 3D and account for its presence in today's cinematic landscape without addressing the linked development of immersive virtual reality systems, the digitization of all aspects of filmmaking, the rise of globe-spanning telecommunication networks, and the shifting nature of the screen in the new media landscape." Nick Jones, *Spaces Mapped and Monstrous: Digital 3D Cinema and Visual Culture* (New York: Columbia University Press, 2020), 1.

[23] Lev Manovich reframes the history of moving images to emphasize the artifice of animation, rather than the reality of photography, to counter the perception of digital media as uncinematic. Thomas Elsaesser looks to early stereoscopy and parallel histories of stereoscopic art to suggest cinema's repression of its associations with 3D. And indeed, the 2013 special issue of *Film Criticism* on 3D, edited by Kristen Whissel, focuses on essays that "take genealogical and archaeological approaches to the analysis of 3-D cinema and media and make connections between a range of past and contemporary uses of 3-D." Additionally, in a 2016 article, Whissel puts *Gravity* (Prime Focus ver., 2013) in conversation with 19th century writings on the stereoscope. Lev Manovich, *The Language of New Media* (Cambridge: The MIT Press, 2001), 296-300; Thomas Elsaesser, "The "Return" of 3-D: On Some of the Logics and Genealogies of the Image in the Twenty-First Century," *Critical Inquiry* 39, no. 2 (Winter 2013): 217-46; Kristen Whissel, ed. "Genealogical and Archeological Approaches to 3-D," special issue, *Film Criticism* 37, no. 3 and *Film Criticism* 38, no. 1 (2013): 8; Kristen Whissel, "Parallax Effects: Epistemology, Affect and Digital 3D Cinema," *Journal of Visual Culture* 15, no. 2 (2016): 233-249.

[24] Erkki Huhtamo and Jussi Parikka, eds., *Media Archeology: Approaches, Applications, and Implications* (Berkeley: University of California Press, 2011), 1, 3.

the cultural perception of various industry practices have shaped the popular perception of 3D conversion.

Although I situate my research more broadly in terms of the interrelationship of production, cultural status, and cinematic aesthetics, I believe it will make a significant contribution to 3D-specific media studies. My research on conversion expands the number and types of films used in scholarship on contemporary 3D cinema. In current scholarly and popular discourse, 3D cinema is most often characterized as having aesthetic value based on its personnel and/or its technology. As will be detailed in my literature review, most scholars have tended to focus on 3D films helmed by renowned directors, including James Cameron's *Avatar* (2009), Werner Herzog's *Cave of Forgotten Dreams* (2010), and Martin Scorsese's *Hugo* (2011), and nearly all 3D films discussed at length are the product of native 3D image capture. By seriously examining the labor and creative aspects of 3D conversion, my dissertation specifically focuses on many works that currently fail to meet normative criteria of art and respectability but that are perhaps more representative of most 3D films. Indeed, in 2015, 19 live-action 3D films received wide releases in the U.S. Of those, only *The Martian* was actually shot in native 3D. In other words, scholars cannot fully understand the industrial and aesthetic contexts for 18 of 2015's 19 3D releases using only existing scholarly research. Finally, by taking 3D conversion seriously as creative practice, I hope to further revise and provide nuance to assumptions about authorship and originality that enter into and exacerbate the conversion bias in the first place.

I do not believe the erasure of 2D-to-3D conversion is entirely unique. Indeed, arguably all labor in film and television is erased, and I see much of the work in production studies focused on better understanding how and why specific forms of creative labor become and remain invisible. Vicki Mayer has closely examined a range of case studies that demonstrate the

invisibility of television producers, particularly those that seem peripheral to what we think about as the creative work of media industries.[25] Even more relevant to this study, Hye Jean Chung argues that the "discourse of seamlessness in professional and scholarly contexts" erases visual effects work and its transnational global workforce.[26] Thus, although I do not see 3D conversion as necessarily more important, or "more erased," than other Hollywood trades and micro-industries, I foreground the creative practice of conversion for two main reasons. Firstly, as I highlight in the previous paragraph, contemporary stereoscopic cinema relies heavily on the labor and aesthetics of 3D conversion, and, thus, our scholarly discussion of 3D cinema is inherently incomplete without a serious consideration of this work. Secondly, and more broadly, because 3D conversion evokes several different debates concerning spectacle, parallel texts, and digital technologies, each with their own power to erase labor, it is an emblematic case study positioned to open up several new paths for rethinking other creative practices erased through cultural discourse.

Methodology

As previously suggested, my research integrates methodologies related to industrial production, cultural status, and film aesthetics. To understand 2D-to-3D conversion as a production practice, I conducted original interviews with key executives, co-founders, and/or supervisors representing the Big Three 3D conversion companies.[27] To situate conversion

[25] Mayer, *Below the Line*.

[26] Hye Jean Chung, *Media Heterotopias: Digital Effects and Material Labor in Global Film Production* (Durham: Duke University Press, 2018), 19.

[27] Reflecting on his experience researching the Visual Effects Society, Paul Malcolm discusses the pros and cons of formal interviews in Vicki Mayer, Miranda J. Banks, and John Thornton Caldwell, eds., *Production Studies: Cultural Studies of Media Industries* (New York: Routledge, 2009), 216-219.

companies and their work in the context of the larger critical dialogue about 3D, I analyzed professional and amateur film criticism. To understand the unique aesthetic challenges that are faced by 3D conversion workers, I also employ close formal readings of the converted films themselves. I do not see these as three distinct data sets but as deeply related types of evidence. Although production studies provides the foundation for my argument, the cultural and aesthetic dimensions of my research will allow for a richer understanding and thorough contextualization of 3D conversion.

For this project, I interviewed representatives of the three main conversion companies: DNEG, Legend3D, and Stereo D. Following the work of John Thornton Caldwell in *Production Culture: Industrial Reflexivity and Critical Practice in Film and Television*, I do not want to simply provide a production account of these industries' practices or take everything I heard in interviews at face value.[28] That is, the self-statements of these practitioners represent complex cultural texts in their own right, valuable both for the information they provide but also the insight they provide into the cultural and aesthetic questions surrounding 2D-to-3D conversion. In total, I conducted seven interviews, each about an hour long, with professionals who either work or previously worked as executives and/or creative supervisors for 3D conversion companies.[29] I acknowledge the limitation of speaking to those in leadership positions, a

[28] John Thornton Caldwell, *Production Culture: Industrial Reflexivity and Critical Practice in Film and Television* (Durham: Duke University Press, 2008).

[29] Especially given that these companies started relatively small, the individuals I interviewed have had fluid job descriptions that include the overlapping duties of executives, managers, and/or supervisors. For example, Paul Becker, senior vice president of business affairs at DNEG as of this writing, and Rob Hummel, president of Legend3D from 2010 to 2012, could be, in part, characterized as public-facing executives, responsible for cultivating relationships with the studios. At the same time, Becker says he was especially hands-on for the stereo on *Aquaman* (Gener8 cr., 2018). I interviewed others whose work might be akin to that of a cinematographer, who specializes in camera and lighting but also oversees camera assistants, focus pullers, and gaffers who also creatively contribute to the film. That is, DNEG's Ben Breckenridge and Disney's Jared Sandrew establish the 3D style for their projects and also supervise teams.

limitation resulting from the restraints of time and the reality of these individuals being public faces for these companies.[30] Given their remove from much of the hands-on creative labor of conversion, I do not believe that the individuals at the top of these companies can speak for everyone below them in the workplace hierarchy.[31] Additionally, for a dissertation skeptical about traditional understandings of texts and their authorship, it would be problematic to reify these companies or their leadership as singular voices. Nonetheless, by focusing on a selective number of key personnel across these companies, I was able to gather a wealth of information about the creative labor in 3D conversion and subsequently contextualize this knowledge within a broader industrial and cultural context that allows us to begin to understand a misunderstood process. Indeed, I encourage further research to explore how the claims I make might be expanded or complicated by the personal perspectives of those not in managerial positions.

I also want to acknowledge that by interviewing professionals in leadership positions, I primarily gathered information about the North America-based operations of 3D conversion companies. However, the time-intensive process of stereo conversion requires a globalized work force, with almost all of the companies employing India-based practitioners. Writing on the effects of globalization, Toby Miller et al. suggest, "the manner in which materials and people

[30] I use terms such as "leadership" and "managerial" with an understanding of how such roles can be dispersed across different facets and levels of media production. Derek Johnson, Derek Kompare, and Avi Santo argue how "management is an unevenly distributed but nonetheless omnipresent dimension of media work in general. Thus, management must be understood as a much wider network of cultural power, negotiated by participants at all levels in institutional hierarchies." Derek Johnson, Derek Kompare, and Avi Santo, eds., *Making Media Work: Cultures of Management in the Entertainment Industries* (New York: New York University Press, 2014), 2.

[31] Vicki Mayer specifically focuses on the broader implications of normalizing such hierarchical structures: "Professionals located 'above the line' managed themselves and used their intellectual capacities, as opposed to tradespeople, artisans, and others 'below the line,' who used their manual skills under the control of managers." Thus, I note the potentially odd position of executives at 3D conversion companies, "above" the artists working under them at the company but still far "below" directors, cinematographers, and other media professionals. Mayer, *Below the Line*, 4.

are exchanged simultaneously across the globe is profoundly asymmetrical."[32] In my interviews, I did not ask questions related to such matters, as I felt these issues would have required a more critical level of engagement that could have alienated subjects. Further, given the sensitivity of such matters, publicly available information does not address the politics of these international relationships, at least not beyond the discourses that appraise these arrangements for enabling the quality of the work.[33] Thus, this study largely does not discuss global politics not because I find them unimportant but as a practical and strategic matter in the service of starting a conversation about 2D-to-3D conversion. Because I largely explore the cultural politics of 3D conversion's place in Hollywood, as well as the relationships among these companies, I encourage further research that interrogates the politics within these companies.

From 2012 to 2015, the 2D-to-3D conversion company Prime Focus (now DNEG) posted a detailed web page for each one of its projects, including quotes from company workers as well as other production personnel. Even if a film's home video special features and general publicity rarely discuss 3D conversion, the companies made their own effort to publicize their creative process in these early years. These blog posts often detail narrative justifications for how depth functions in particular scenes, suggesting the complex role of creative interpretation in the production of a 3D conversion. Prime Focus's project pages also discuss their working relationships with directors, visual effects houses, and other 3D conversion companies, emphasizing the concrete institutional networks necessary to the conversion process. Such behind-the-scenes sources not only served as inspiration for interview questions but also

[32] Toby Miller, Nitin Govil, John McMurria, Richard Maxwell, and Ting Wang, *Global Hollywood 2* (London: BFI Publishing, 2005), 51.

[33] The discourses around these 3D conversion companies thus resonate with questions of transnational labor as explored by Chung in relation to visual effects. Chung, *Media Heterotopias.*

represented important cultural texts ripe for analysis in their own right. To be clear, I do not see such evidence as free of bias or ulterior motives. As I will detail in the second half of Chapter 1, much of this language appears directed at prospective clients, such as the Hollywood studios in need of 3D conversion services. Still, these sources prove invaluable as some of the only sources that detail 3D conversion's technical and creative processes. Just as importantly, for a dissertation concerned with public perception, I see these materials as exemplifying how 3D conversion professionals strategically mobilize information about production practices to reframe their craft for a potentially skeptical audience.[34]

Thus far, this section has focused on methods and sources relating specifically to 3D conversion companies, but as discussed previously, this dissertation is equally concerned with understanding the larger context that shaped the public perception of 3D. To situate the companies' self-statements within the industry's broader conversation about 3D and digital cinema, I also draw on consumer and trade publications' accounts of the contemporary 3D boom. News reports and columns laid bare the creative and economic debates within Hollywood about 3D, particularly around such perceived public failures as the much-maligned 3D in *Clash of the Titans* and the cancelled 3D release of *Harry Potter and the Deathly Hallows – Part I* (Prime Focus ver., 2011).[35] I argue that these early public relations nightmares, along with the industry's focus on 3D's boost to box office revenues, had a lasting impact on the cultural perception of 3D conversion. Further, publications such as *Forbes* and *Variety* occasionally featured interviews with those working in 3D conversion, offering insight into how practitioners characterize 3D

[34] For a rare instance of a book featuring a discussion of 3D conversion using original interviews, see Celine Tricart, *3D Filmmaking: Techniques and Best Practices for Stereoscopic Filmmakers* (New York: Routledge, 2017), 81-89.

[35] Although the seventh *Harry Potter* film was not released in a 3D version for its 2010 theatrical release, a 3D conversion was made available in Blu-ray 3D in 2011. Additionally, I use "ver.," standing for "verified" to indicate films listed on conversion company filmographies but not yet independently checked through the ending credits.

when speaking to a broader audience.[36] Often, interviewees such as Legend3D founder Barry Sandrew used these platforms to convince a skeptical audience of 3D conversion's artistic and creative value.

To further explore the popular debates over 3D's cultural value, I analyze professional and amateur film criticism. On one level, I analyze how film critics have characterized 3D conversion, including the aesthetic assumptions underlying their (often antagonistic) arguments. But further, I am interested in the *reception of reception* by conversion practitioners, how 3D professionals directly and indirectly address public (mis)conceptions of 3D. That is, I see trade reports and critical reviews not simply as static responses to films or industry practices but as discourses in a dynamic dialogue that includes studio executives and 3D conversion professionals. I also explore how film critics have erased creative labor of 3D conversion entirely. Indeed, some critics have employed factually incorrect information to support claims about the creative illegitimacy of 3D conversion. In a review of *The Amazing Spider-Man 2* (Legend3D cr., Prime Focus uncr., 2014), one critic praises the film's 3D: "Unlike Disney who has their Marvel movies shot in 2D and then has them converted into 3D in post-production, Sony has these movies shot using 3D cameras. This is one of those cases where you can really see a difference."[37] Ironically, this critic was not able tell the difference, as Legend3D converted

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[36] See "Chat live with David S. Cohen and Legend 3-D's Barry Sandrew," *Variety*, April 28, 2011, http://variety.com/2011/digital/news/chat-live-with-david-s-cohen-and-legend-3-ds-barry-sandrew-31794/; Mark Hughes, "The Science And Future Of 3D Films, With Legend3D Founder, COO And CTO Dr. Barry Sandrew - Part 1," *Forbes*, October 25, 2011, http://www.forbes.com/sites/markhughes/2011/10/25/the-science-and-future-of-3d-films-with-legend3d-founder-coo-and-cto-dr-barry-sandrew-part-1/#73b42258ca93.

[37] Throughout this dissertation, I use "cr.," standing for "credits," to indicate that the preceding company or companies received credit at the end of the film. When multiple companies precede "cr.," they appear here in the same order of appearance in the credits. By contrast, "uncr." follows the name of companies that worked on the film in question but did not receive credit at the end of the film. These were instead verified through independent sources such as the companies' sites or my personal interviews.. "'The Amazing Spider-Man 2' Is Not All That Amazing," *Star Pulse*, April 30, 2014, http://www.starpulse.com/news/Two_Jews_On_Film/2014/04/30/review_the_amazing_spiderman_2_is_not_.

the 2D *Spider-Man* footage to 3D in post-production. The point here is not to be a fact checker but to see how facts or falsehoods about production are strategically mobilized to support value judgments about 3D production practices. In this sense, I am also interested in the *reception of production* by film critics. By synthesizing the discourses of 3D conversion companies, the industry at large, and film critics, I explore how 3D conversion has been accepted, rejected, or negotiated as a cultural phenomenon.

Lastly, this project uses formal analysis of 3D conversions to understand how the films work and, whenever applicable, how they compare and contrast with their 2D counterparts.[38] In part, I see this as a process of reverse engineering that enables me to understand 3D workers' creative decisions. Although I asked practitioners about their thought processes for specific projects, comparisons using the films themselves offer ample evidence for the sort of aesthetic challenges these workers face when rethinking 2D aesthetics as 3D space. In this regard, it is important for scholars to be familiar with the stylistic results of the crafts they examine. Indeed, when scholars of production write about cinematographers, most of their academic readers have general knowledge about how cinematography works in film, but this is not necessarily—or even usually—the case with 3D conversion. To understand the *workers*, it is imperative to also understand their *work*. The relatively recent availability of films on 3D Blu-rays allow for a careful analysis of stereoscopic aesthetics that are beyond the reach of mainstream film critics writing on deadline about an ephemeral cinematic experience.[39]

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[38] Although I focus on the film industry, I see my work as resonating with what M.J. Clarke has called, "a particular tradition of studies of television production that integrates industrial data in the form of both business strategy and individual practice with textual data through the analysis of programming and suggests the ways in which programming trends replicate, complicate, or anticipate the conditions of production itself." M.J. Clarke, *Transmedia Television: New Trends in Network Serial Production* (New York: Bloomsbury, 2013), 14.

[39] I acknowledge that the experience is not exactly the same for those in theater and for those at home with a 3D Blu-ray, especially with the different relative parallax values—two images separated by several feet versus a few

As I have organized my dissertation according to creative practices and relevant cultural discourses, I consistently put production, critical discourse, and films in dialogue with each other rather than analyzing them separately. That is, the 3D conversions themselves can support or perhaps negate what practitioners claim about their creative process, and the realities of production may challenge 3D skeptics' value judgments. I cannot disentangle these different frameworks as they all necessarily corroborate and/or complicate each other both in the work of conversion and in the work's conversion products.

Chapter Breakdown

As previously noted, I have organized my chapters around specific aspects of 2D-to-3D conversion as a production practice and bad cultural object. I do so because I see the popular perception of 3D conversion as layered, representing the intersection of several elements that are artistically and culturally suspect. Put another way, 3D conversion represents a site of contestation where the industry expresses a number of deep, overlapping anxieties. To emphasize this argument, each chapter focuses on a specific layer or anxiety that potentially inflects popular understandings of 3D conversion. Further, all of the chapters are similarly structured. I begin each chapter with secondary research (and sometimes supporting primary research) that establishes industrial or cultural precedents and possible theoretical framings for the key issue at hand. I then focus on contemporary discourses in trade publications and mainstream criticism that exemplify how the issue has manifested itself in relation to contemporary 3D. Finally, I end each chapter with stylistic analysis of 3D films or discourse analysis of 3D conversion workers' words to demonstrate how a closer consideration of 3D conversion work complicates these

inches. However, the basic creative decisions of emergence and immersion remain intact, allowing for close analysis of the aesthetic properties.

outside conceptions. So effectively, I do not explore 3D conversion in detail until about halfway through a chapter. Although this may seem counterintuitive for a dissertation about 3D conversion, I find it essential to contextualize upfront, as the backgrounds allow us to see how 3D conversion is, in many ways, not entirely new but wholly consistent with longstanding cultural debates about cinema. While it might be an oversimplification to characterize this structure as "dominant discourse followed by counter-discourse," I do see each chapter as mapping out various approaches to considering 3D conversion, and putting these perspectives in tension with each other.

In Chapter 1, I establish the key players in the story of 3D conversion, and I explore the cultural debates around the artistic legitimacy of 3D conversion and 3D more broadly. I frame this analysis using histories of stereoscopic 3D in Hollywood, specifically how the technology has been repeatedly associated with spectacle and production differentiation at moments of industrial crisis. I then analyze how similar discourses played out in the industry and critics' conversations about contemporary 3D, with a focus on the early boom in 3D releases after the success of *Avatar* in late 2009. In these early days, Hollywood often discussed 3D cinema as a box office boost and a pretext for digital projection in theaters, and I argue that film critics ironically adopted Hollywood's logic, resisting the perceived financial scheme but then never moving past notions of quantity and added value in how they wrote about 3D. Finally, I then move to a counter-history largely absent in the mainstream press, the actual stories of the main three conversion companies: DNEG, Legend3D, and Stereo D. I use this space as an opportunity to show how the professionals at these companies have rationalized their work in terms that effectively respond to popular (mis)conceptions, or reframe how we can think about the creative work of 3D conversion.

In Chapter 2, I build on these cultural discourses of 3D, past and present, by considering 3D conversion in the context of debates over the artistic legitimacy of reformatted film texts. I specifically examine 3D conversions of classic 2D films, such as *The Wizard of Oz* (Prime Focus ver., 2013) and *Jurassic Park* (Stereo D ver., 2013). Purist scholars and film critics have characterized films modified for nontheatrical exhibition and distribution as corruptions of filmmakers' creative visions. I rethink these ancillary versions as parallel texts, a term that describes different versions of films with include concrete, formal changes. While this term can apply to a wide range of production, distribution, and consumption practices, I see controversies surrounding pan-and-scanned widescreen movies or colorized black-and-white movies as the clearest precedents for 3D conversion. If the supposed spectacle of 3D conflicts with normative ideas about classical restraint, stereoscopic conversion's status as a derivative form linked to commercial purposes troubles cultural assumptions about originality and singular authorship. Anticipating and/or responding to such criticisms, 3D conversion companies often frame their work on classics as rooted in respect for original 2D films, as manifested in new high-definition remasters and careful research of production histories.

As previously suggested, I consider the work of producing a parallel text an act of creative interpretation.[40] Problematizing the notion that a 3D conversion is an unnecessary expression of the depth created in the "original" 2D text, I see 3D conversion as a process of aesthetic negotiation between familiar 2D cinematic language and unique stereoscopic capabilities. Over a century of cinema, filmmakers have developed a visual grammar to

[40] I considered using the term "creative translation," but I felt that, for some readers, this could connote a more objective process. Still, scholars such as George Steiner has emphasized the "poetics" of translation, and the contingency of language: "When we read or hear any language-statement from the past … we translate. Reader, actor, editor are translators of language out of time." George Steiner, *After Babel: Aspects of Language and Translation* (London: Oxford University Press, 1975), 28, 48.

communicate perspective without the parallax humans possess so as to see phenomena in depth.[41] Consequently, the creative laborers of conversion companies closely analyze feature-length 2D films frame by frame, a level of analysis that would exhaust even the most dedicated scholar of film aesthetics. In converting 2D footage, conversion practitioners have the opportunity to exaggerate depth that is otherwise implicit, but they can also create a level of depth where it is not originally implied. That is, the conversion creative workers might add extra stereoscopic depth to scenes shot with long lenses or shallow focus, cinematographic techniques historically used to limit the sense of depth in a particular shot. Linda Hutcheon refers to the process of adaptation, in part, as a "process of creation," an act that "always involves both (re-) interpretation and then (re-) creation."[42] I view 3D conversion through a similar lens to underline the subjectivity of this practice. With regard to *Top Gun*, I illustrate such creative and interpretive challenges through a comparative analysis of the film's original 2D release and Legend3D's 2013 conversion. For these films, I primarily rely on my own close readings, rather than on the practitioners' explanations. The films themselves contain instances of both conflict and coherence between 2D and 3D elements, demonstrating how stereoscopic conversions can open up unique interpretive possibilities. As Hutcheon puts it, adaptations can also be considered from the "process of reception," as we experience such works "through our memory of other works that resonate through repetition with variation."[43]

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[41] Steve F. Anderson proposes "parallax" as a metaphor for the differing viewpoints offered by data and images (rather than by the left eye and the right eye). Steve F. Anderson, *Technologies of Vision: The War Between Data and Images* (Cambridge: The MIT Press, 2017), 21-23.

[42] While I acknowledge scholars of adaptation as influencing of my thinking, I should note that adaptation studies largely focus on the relationship between works in two different mediums, or two clearly different texts within the same medium. Thus, while adaptation studies typically focus on the intertextual, a process like 3D conversion requires us to consider the *intra*textual. Linda Hutcheon, *A Theory of Adaptation*, Second edition (London: Routledge, 2013), 8.

[43] Hutcheon, *A Theory of Adaptation*, 8.

In Chapter 3, I build on my characterization of converted 2D classics as parallel texts by exploring how the creative process differs for the conversion of contemporary 2D blockbusters into 3D. While still seeing 3D conversion in these instances as requiring interpretive labor and close critical reading, the concurrence of production and conversion processes allows for collaboration with 2D filmmakers, and can necessitate nonlinear workflows that trouble the perception of 3D conversion as mere post-production afterthought. I frame this discussion by considering how the rise of digital filmmaking technologies have troubled traditional definitions of cinematic art, including how purist attachment to film's analog history and its theorized indexicality often obscures the labor required for digital media. Writing on computer-generated visual effects, Hye Jean Chung notes that "the development of computerized processes often entails the misguided notion that, when a computer takes over work previously done by humans, it eliminates the human factor in the production process."[44] I see such cultural assumptions as essential to the perceived superiority of native 3D, in which the physical presence of the camera on set makes it more difficult to dismiss than the work of 3D conversion.

If 3D conversion can be understood, in part, through the relationship between 2D and 3D versions of the same film, I use Chapter 3 to examine different possible ways to understand that relationship for simultaneous co-releases, and how we conceptualize what constitutes the proper version of "the text." To suggest how popular press has conceived of this relationship, I analyze *Cinema Blend*'s column entitled "To 3D or Not to 3D," which advises whether viewers should pay the extra few dollars to see a film projected in 3D, or whether they should simply stick with the (cheaper) 2D version. My analysis of this column reveals how critics and audiences commonly articulate the value of 3D in terms of spectacle and quantity. Finally, to trouble

[44] Chung, *Media Heterotopias*, 14.

assumptions about both digital automation and 3D quantity-as-quality, I end this chapter with a sustained analysis of how 3D conversion professionals explain the creative work of translating 2D footage into 3D space. Contradicting the popular assumption of digital tools as automated, the various companies' 3D conversion processes offer a range of possibilities that allow for diverging theories of how to most effectively create a parallel 3D text. This final section contains my most sustained engagement with my original interviews, and these practitioners' statements suggest how 3D professionals come to develop styles and theories of 3D conversion that often echo formalist or realist traditions of classical film theory.

Although Chapter 3 engages most directly with digital cinema's complicated relationship with the medium's analog origins, digital technologies' impacts on film recur throughout this dissertation. As I will discuss in Chapter 1, both industrial and scholarly discourses concerning the arrival of digital 3D conceived of the third dimension as a "killer app" or "Trojan Horse" to expedite the digital overhaul of exhibition.[45] My notion of parallel texts elaborated in Chapter 2, while a phenomenon almost as old as the cinema itself, has become more pertinent as new technologies have accelerated the (sanctioned and unsanctioned) spread of media texts.[46] And finally, Chapter 3 engages with scholarly interventions about digital filmmaking tools and visual effects to consider how our understanding of 3D conversion can build on scholarly theorizations that have moved away celluloid's supposed indexicality, such as Stephen Prince's "perceptual realism" and Lev Manovich's argument that live-action be seen as but one element of an

[45] Peter Debruge, "3-D exhib boom's new post puzzles," *Daily Variety*, April 13, 2007; David Bordwell, "Pandora's digital box: In the multiplex," *Observations on film art*, December 1, 2011, http://www.davidbordwell.net/blog/2011/12/01/pandoras-digital-box-in-the-multiplex/.

[46] Henry Jenkins, *Convergence Culture: Where Old and New Media Collide* (New York: New York University Press, 2006); Henry Jenkins, Sam Ford, and Joshua Green, *Spreadable Media: Creating Value and Meaning in a Networked Culture* (New York: New York University Press, 2013).

animation-based digital cinema.[47] Taken together, these varied connections with digital media show how 3D conversion is at once a particular example of many related technological changes and also one uniquely inflected with the aberrant cultural history and perception of 3D cinema.

As the overarching context of cinema's digital transformation suggests, although I developed each chapter with a specific through line, concepts and arguments recur across different chapters of this dissertation. 2D-to-3D conversion represents a complex intersection of disparate discourses, and in reality, these various strands do not operate in isolation. Still, I see such a structure as allowing a deconstruction of the layered cultural assumptions of cinema and media that affect popular perceptions of industry practices such as 3D conversion. Indeed, it is precisely 3D conversion's confluence of multiple artistically suspect practices that requires one to parse out its various industrial and cultural lineages. In doing so, I hope not only to rethink 3D conversion as labor and, consequently, expand how scholars conceive of creativity in stereoscopy. An exploration of 3D conversion also allows us to further consider how cultural assumptions about Hollywood technologies, recirculated texts, and digital labor can limit our recognition of creative, intellectual labor.

If the organization of my dissertation chapters strategically separates various threads in the service of thinking through and past their interconnectedness, my literature review does something similar. As previously stated, I situate my work at the intersection of media scholarship on production, cultural status, and film aesthetics, and to this end, this literature review maps out potential relationships among these subfields that inform my research on 2D-to-3D conversion.

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[47] Stephen Prince, *Digital Visual Effects in Cinema: The Seduction of Reality* (New Brunswick: Rutgers University Press, 2012); Manovich, *The Language of New Media*.

Literature Review

No single cinema and media studies framework adequately addresses the unique issues related to 2D-to-3D conversion, thus my project necessarily integrates approaches from disparate media subfields. Production studies provides the foundation for my analysis of conversion companies' creative labor, but I support this analysis with scholarly methods concerning cultural status, film aesthetics, and 3D cinema. This literature review will demonstrate how, considered together, this varied body of scholarly work allows for a thorough understanding of 2D-to-3D conversion. It will also illuminate how and why each of these individual areas, on its own, falls short as a conceptual model for the creative practices of film reformatting.

The first section of the review details how I integrate scholarship on production and cultural capital. I suggest how studies of production can benefit from a more thorough accounting of the critical discourse surrounding its object of study, and in turn, how studies of cultural legitimation can be strengthened by more precise accounts of how cultural value judgments have significant impacts in specific production contexts—in this case, 2D-to-3D conversion. My second section details how scholarship on film form can be both supported and complicated by creative labor and cultural status. The third and final section addresses scholarship specifically focused on 3D cinema. Here, I demonstrate how my considered interrelation of the literature on production, cultural status, and film aesthetics can expand both what types of 3D movies scholars discuss and how scholars think and talk about those films.

The Intersection of Production and Cultural Status

This first section establishes the scholarly models for my production-centric approach to 2D-to-3D conversion and, just as importantly, my synthesis of production studies and work on

cultural status. As noted in my methodology section, my research is, in part, interested in the "reception of reception" by 3D conversion workers—that is, how these individuals directly and indirectly respond to what tends to be critical dismissal of their work. Throughout this dissertation, I also show how the concept of authorship functions discursively, in both below-the-line production discourse and professional film and television criticism. Indeed, questions of authorship underline how popular ideas about production practice and cultural value are often interrelated, again making the case for the intersection of these two scholarly frameworks for a dissertation on 2D-to-3D conversion.

When I discuss cultural capital and the politics of taste, I draw from Pierre Bourdieu's work on the social construction of aesthetic value systems that are rendered invisible and self-evident.[48] Bourdieu demonstrates how "cultural practices … and preferences in literature, painting or music, are closely linked to educational level … and secondarily to social origin."[49] While I do not explicitly link issues of cinematic taste to markers of class as Bourdieu does, I build on his contention that gatekeepers, such as scholars and critics, cultivate and manage aesthetic dispositions that have become naturalized as innate. Further, Bourdieu suggests that "cultural consecration does indeed confer on the objects, persons and situations it touches, a sort of ontological promotion akin to a transubstantiation."[50] By foregrounding 3D conversion and tracing the lineages of discourses that shape this industrial practice's exclusion from "cultural consecration," I hope to emphasize the contingency of how we perceive the cultural value of media texts and, by extension, the creative labor required for their production.

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[48] Pierre Bourdieu, *Distinction: A Social Critique of the Judgement of Taste*, trans. Richard Nice (Cambridge: Harvard University Press, 1984).

[49] Bourdieu, *Distinction*, 1.

[50] Bourdieu, *Distinction*, 6.

Some bottom-up studies of art production do, in fact, account for the relationship between individual agents and systems of artistic value. Sociologist Howard S. Becker's *Art Worlds* examines the production of art in any given discipline not as an innate act of creative expression but as the product of an intricate network of individuals.[51] Thinking holistically about art worlds such as painting, music, and cinema, Becker deconstructs the functions of artists, audiences, distributors, critics, the state, and other individuals. He argues their different roles are co-constitutive, defining each other and ultimately defining the boundaries of a particular art world and its objects. These different agents all circulate ideas about what is and is not "legitimate" art, an important component of my own argument about the current valuation of 2D-to-3D conversion practitioners and the films they "reformat."

If Becker's analysis across various artistic disciplines examines how an art world defines itself, John Thornton Caldwell's research on production cultures elaborates how contemporary film and television practitioners develop such professional self-definitions in more specific industrial contexts. In *Production Culture*, Caldwell argues that film and television workers theorize and make sense of their own creativity and labor in sophisticated ways. Academics might be quick to claim aesthetic and social theory as their territory, but Caldwell argues that "theoretical competence" is also an important "factor in the making of contemporary movies."[52] That is, filmmakers above and below the line develop working theories of how a text will affect the viewer (e.g. how a specific editing decision will tell the story) as well as theories about how their trade or profession operates as a cultural formation.[53] These insights have been foundational

[51] Howard S. Becker, *Art Worlds*, 25th Anniversary Edition (Berkeley: University of California Press, 2008).

[52] Caldwell, *Production Culture*, 15.

[53] Barry Dornfeld relatedly reframes media producers as audiences: "A reconceptualization of the production process, or the process of encoding, as a multiple and richly contested one encourages a greater unity between unnecessarily divided, incongruent theoretical discourses about production and consumption and provides a fruitful

to my conceptualization of 2D-to-3D conversion as an act of creative interpretation. Although 3D conversion might be characterized in professional critical discourse as lacking originality, Caldwell's approach can be applied to underline the subjective, critical capacity necessary to interpret 2D film images and then spatialize them as 3D in ways that not only replicate the original text but also modify, enhance and/or otherwise complicate it.

Caldwell's research foregrounds his use and integration of different types of sources as well as his aim to keep these different discourses "in critical tension or dialogue with the others."[54] As I discussed in my methodology section, my proposed interrelation of production, cultural status, and film aesthetics similarly keeps claims made in my original interviews and other primary sources in check. Without acknowledging the dialogic quality of these discourses, scholars might offer a subject's culturally constructed perspectives as absolute truths. For example, in *Not Hollywood: Independent Film and the Twilight of the American Dream*, anthropologist Sherry B. Ortner studies how contemporary independent filmmakers define themselves in relation to Hollywood as outside of and working against the traditional commercial system.[55] Although Ortner's approach deconstructs much of the independent filmmaking world's discourse about itself, *Not Hollywood*'s prose often reproduces the language and ideas of its subjects. At times, the study links specific modes of production to different levels of critical engagement. Ortner argues that, unlike independent films, Hollywood movies require ideological deconstruction to reveal "their forms of subjectivation of viewers, their false pictures

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engagement with the study of media production." Barry Dornfeld, *Producing Public Television, Producing Public Culture* (Princeton: Princeton University Press, 1998), 14.

[54] Caldwell, *Production Culture*, 4.

[55] Sherry B. Ortner, *Not Hollywood: Independent Film and the Twilight of the American Dream* (Durham: Duke University Press, 2013).

of the real world."[56] This view of Hollywood film underestimates the complexities of spectatorship and undercuts the possibility of oppositional or negotiated readings of popular media. Thus, by emphasizing the complexities of spectatorship, and by engaging divergent cultural discourses alongside each other, I hope to underline the constructed nature of the various perspectives explored through this dissertation (including, hopefully, my own).

Specifically, my attention to questions of taste and cultural value draws from scholarship on contemporary television. In *Legitimating Television: Media Convergence and Cultural Statu*s, Michael Z. Newman and Elana Levine argue that the notion of contemporary "Quality TV," exemplified by complex narratives and cinematic aesthetics, rests upon the denigration of the television's domestic, feminized, and classed past.[57] (Indeed, in relation to Ortner's work, there is an interesting parallel between independent film's definition of itself as "not Hollywood" and HBO's official branding of itself as "not TV.") In my research, rigorous and self-conscious discourse analysis allows me to uncover the similarly complex and sometimes-contradictory ways that 3D conversion professionals attempt to discursively legitimize their work. Similar to how Newman and Levine see TV's present distancing itself from TV's past, I see contemporary 2D-to-3D conversion practitioners dismissing popular conceptions of stereoscopic filmmaking's history to position themselves as culturally and aesthetically legitimate.[58]

Just as studies of production can be strengthened by serious considerations of popular and critical discourse, analyses of cultural status can benefit from a richer understanding of taste's impacts on production workers. Newman and Levine's *Legitimating Television* gestures toward

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[56] Ortner, *Not Hollywood*, 9.

[57] Newman and Levine, *Legitimating Television*, 40.

[58] For scholarship on negative parallax—emergence from the screen—as a key aspect of 1950s 3D aesthetics, see William Paul, "The Aesthetics of Emergence," *Film History* 5, no. 3 (1993): 321-355.

production in a chapter on the television showrunner, but its focus is more on the discursive function of the concept of authorship for audiences rather than for creative laborers. Newman and Levine note how the showrunner-auteur, the producer-writer tasked with overseeing the production of a particular TV series, is a "term in the discourse of television's legitimation, promoting the author-function of the showrunner as a guarantee of value."[59] That is, just as the commercial enterprise of cinema ostensibly became more artistic and more culturally valuable with the conceptualization of directors as artists, commercial TV has become more legitimate because of the showrunner's emergence as an authorial voice. Nonetheless, however insightful, this particular chapter does not address how the concept of the author erases other creative labor that is necessary to support and implement an ostensibly "singular" vision. For my dissertation, I hope to both identify discourses of legitimation such as authorial "presence" or "style" and understand how these constructs impact individuals working in 2D-to-3D conversion. As I discuss in Chapter 1, 3D conversion professionals often use publicity materials to strategically characterize their work as part of the director's vision, highlighting collaborations with directors of the 2D production process. Echoing cultural understandings of singular authorship in art, these practitioners attempt to reframe 3D conversion as more than a creative afterthought.

Similarly interested in professional self-rationalizations, Denise Mann both criticizes the discursive construction of television authorship and identifies concrete manifestations of authorial hierarchies' impact on practitioners. In "It's Not TV, It's Brand Management TV: The Collective Author(s) of the *Lost* Franchise," Mann uses on-site observation and interviews with practitioners to better understand authorship in relation to the transmedia franchise *Lost* (2004-

[59] Newman and Levine, *Legitimating Television*, 40.

2010).[60] In particular, Mann attempts to reconcile the paradoxical simultaneity of, on one hand, the franchise's collective authorship which is dispersed among hundreds of individuals and, on the other hand, the persistence of work hierarchies that prioritize the vision of the television showrunner. She offers one account of interviewing a low-level staff writer and a supervising producer at the same time, and how the lower-level writer "called the day after our interview to reassert that the more senior writer-producer's explanation of how things worked should always take precedence over his own remarks."[61] I am also interested in the contradictions of professional self-presentation, often alternately assertive and self-effacing. As I will demonstrate, 2D-to-3D conversion companies and their workers simultaneously assert their capacity for creative interpretation while still evoking the 2D films' director as the aesthetic visionary and legitimizing force. Thus, as is Mann, I am interested in the industrial function of the author in new contexts of collaboration—here between 3D conversion practitioners and their 2D production counterparts. Moreover, my research similarly suggests how widespread ideas about creativity and authorship not only affect how critics and audiences understand media texts but also how media practitioners understand themselves and their work.

Although Mann's research on contemporary television provides a way for thinking through the specific impact of critical and artistic discourses on practitioners, I am particularly sensitive to the specifics of the different production and technological contexts for 2D-to-3D conversion. In *Plastic Reality*, Julie A. Turnock argues that, far too often, media scholars tend to

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[60] Mayer, Banks, and Caldwell, eds., *Production Studies*, 99-114.

[61] M.J. Clarke demonstrates the other side of this equation with the example of a *Lost* co-showrunner throwing a tie-in novel under the bus or, more accurately, into an airliner's engine: "After the book [*Bad Twin*] was met with less-than-enthusiastic responses, the *Lost* showrunners attempted to distance themselves from the project, supporting the claim that the book's fictitious author, Gary Troup, was indeed the man flung into the wrecked airliner's engine in the series pilot and that, in the words of co-showrunner Damon Lindelof … 'considering that I have now read *Bad Twin*, Gary Troup got exactly what he deserved." Mayer, Banks, and Caldwell, *Production Studies*, 105; Clarke, *Transmedia Television*, 63.

characterize different visual effects practices in such generalized ways that they erase the complexity of both the creative labor and the aesthetics associated with specific technological forms. Turnock clarifies how, for the different processes conflated under catchall understandings of visual effects, "software, platforms, pipelines, and workflows are not easily compatible or collapsible…nor are their personnel interchangeable."[62] Although she focuses on 1970s special effects, Turnock invites scholars to study the specific institutions and aesthetics of related film technologies, including 3D.

Turnock uses practitioner discourses found in archival materials and contemporaneous trade magazines to historically contextualize the production and understanding of special effects in the 1970s. In doing so, she troubles discursive boundaries between "artistic" films and "commercial" movies. Specifically, Turnock underlines the historical and creative similarities between the commonly opposed Hollywood Renaissance and blockbuster boom. That is, she repositions the effects-heavy aesthetics of George Lucas and Steven Spielberg as extensions of auteurism and anti-Hollywood naturalism. These blockbusters, she argues, represent "an elaboration of [New Hollywood's auteurist] ethos by allowing filmmakers to more fully express their own personal vision *through* the effects work."[63] In other words, Lucas and Spielberg today might be widely associated with the beginning of the end for personal filmmaking, but they emerged from the same impulse and historical context as did the more clearly valued "legitimate" art of Robert Altman or Martin Scorsese. Turnock's argument thus demonstrates how the careful contextualization of film production can problematize not only assumptions

[62] Julie A. Turnock, *Plastic Reality: Special Effects, Technology, and the Emergence of 1970s Blockbuster Aesthetic*. (New York: Columbia University Press, 2015), 5-6.

[63] Turnock, *Plastic Reality*, 2.

about the cultural value of specific technological approaches to cinema but also about the hierarchical concept of authorship.

Nonetheless, Turnock does not explicitly situate her study in the context of cultural studies or scholarship on taste, which I see as offering the potential contexts for extending the theoretical implications of her work—as well as my own.[64] Although cultural capital is a relatively minor component of Turnock's historical argument, it is an important focal area of my dissertation on contemporary production practices. By contextualizing a specific study of 2D-to-3D conversion within larger critical debates about aesthetic legitimacy, I hope to provide a thorough account of how various cultural and aesthetic tensions inform the practitioners' creative interpretation of 2D films as parallel 3D texts.

Creative Labor and Film Form

Although Turnock mobilizes practitioner discourse as a central part of her argument, she does not explicitly position her work in the context of production studies. Instead, she positions her book as a study of film aesthetics. In this context, Turnock suggests that the specific aesthetic properties of particular films and their possible impact on the viewer "can be tested against the rhetorical claims made for them" by special effects workers.[65] Using formal analysis that compares 2D and 3D versions of films, I also incorporate cinema and media studies approaches to film aesthetics and style. In some ways, my desire to combine cultural studies-influenced

[64] Turnock's work on the relationship between avant-garde artists and Hollywood special effects companies provides an especially fascinating parallel to Lynn Spigel's research on the institutional and aesthetic convergence of high art and television. See Lynn Spigel, *TV By Design: Modern Art and the Rise of Network Television* (Chicago: The University of Chicago Press, 2008).

[65] Turnock, *Plastic Reality*, 172.

production studies and formal analysis might seem counterintuitive.[66] However, if as Caldwell, argues, basic theories of moving images are a necessity for film and television practitioners, then we must examine both how 2D-to-3D conversion workers think about film form as they go about their work of creative interpretations, and also engage with the stylistic properties of the conversions themselves.[67] My study thus engages in the formal specificity of film aesthetics while also questioning how specific stylistic concerns have contributed to cultural hierarchies of aesthetic tastes and legitimation. Although the third and final section of this literature review will address 3D-specific studies of film, here my focus is on relevant studies of contemporary 2D cinema.

A key precedent for my own work, Hye Jean Chung's *Media Heterotopias: Digital Effects and Material Labor in Global Film Production* employs a novel form of textual analysis to highlight the material labor of film production, creative work that is functionally erased by classical understandings of a unified text. Specifically, Chung uses what she calls "heterotopic analysis," which "recognizes digitally constructed assets and composited environments as incarnations of material realities attached to actual locales and physical bodies."[68] That is, popular and professional discourses pertaining to visual-effects cinema emphasize the seamlessness and singular diegesis of the text, but visual effects workers expend a great deal of time and effort in actual material spaces around the world to create different elements for a composited mise en scene. To this end, Chung studies "spectral effects," the traces that direct

[66] For a work of cultural studies that engages aesthetics and form—and that positions itself as an intervention for doing so—see John Thornton Caldwell, *Televisuality: Style, Crisis, and Authority in American Television* (New Brunswick: Rutgers University Press, 1995).

[67] Caldwell, *Production Culture*.

[68] Chung, *Media Heterotopias*, 3.

close readers to the disparate geopolitical sources of a film's imagery.[69] Thus, like Chung, I see textual analysis as a way of making inferences about erased forms of creative labor. While Chung focuses on specific assets that highlight a transnational force of visual effects workers, I examine how 3D conversion evinces the interpretive work of 3D companies.

Given that I compare the formal properties of 2D and 3D parallel texts, my dissertation also touches upon scholarly and popular debates about contemporary filmmaking aesthetics. When converting contemporary blockbuster films from 2D to 3D, the companies discussed in my dissertation must work with (and sometimes against) dominant stylistic norms of 2D filmmaking. In a series of video essays, Matthias Stork coins the term "chaos cinema" to describe the breakdown of traditional classical continuity and spatial relationships in the contemporary action film.[70] Much of the time, conversion companies are employed to add three-dimensional depth to the very kind of films that Stork might see as destroying space. For example, Legend3D converted the shaky handheld cinematography of *Man of Steel* (cr., 2013), Prime Focus worked with the rapid editing of *World War Z* (ver., 2013), and both Gener8 and Stereo D reckoned with shallow depth of field throughout *Godzilla* (cr., 2014). To adequately understand the aesthetic and stylistic challenges faced by the creative laborers at 3D conversion companies, it is thus essential to understand the contemporary aesthetics of action and 2D filmmaking more broadly.[71]

As already suggested, hierarchies of value inevitably complicate a formal or aesthetic approach to 2D-to-3D conversion. In a way, using the terms of an aesthetician might tend to

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[69] Chung, *Media Heterotopias*, 2.

[70] Matthias Stork, "Chaos Cinema Part 1," Vimeo video, 10:23, posted by matze, August 22, 2011, https://vimeo.com/28016047; Matthias Stork, "Chaos Cinema Part 2," Vimeo video, 8:09, posted by matze, August 22, 2011, https://vimeo.com/28016704; Matthias Stork, "3," Vimeo video, 14:43, posted by matze, April 23, 2012, https://vimeo.com/28016704.

[71] For a study of action films that foregrounds spatial theory, see Nick Jones, *Hollywood Action Films and Spatial Theory* (New York: Routledge, 2015).

reinforce the very value systems I hope to deconstruct. Nonetheless, I embrace this tension. Both the critical discourse surrounding 3D conversion and the challenges of contemporary 2D aesthetics prove critical to our understanding of how these companies and their creative laborers conceptualize their work. In an *fx guide* interview regarding the 3D conversion of *Top Gun*, Legend3D's Barry Sandrew notes the original 2D film's extensive use of long lenses, which "tend to compress space, flatting the subject in frame. While this can be desirable in a 2D film, for a 3D film that is shot 'natively' it can be a serious issue. However, with 2D to 3D conversion the sky is the limit. We are lens agnostic and can create depth that would otherwise be impossible through conventional capture."[72] This quote suggests how creative laborers at conversion companies think and talk about film form in ways that justify their work as creative interpretation. On one level, then, I use the scholarly models of formal analysis to better understand the creative decisions made for 2D-to-3D conversion projects. However, on another level, I remain self-aware of how discourses about film form can also function as a form of cultural legitimation.

There are few aesthetically focused studies of "reformatted" movies, but Jason Gendler's "Are My Eyes Really Brown? The Aesthetics of Colorization in *Casablanca*" offers a useful model for the analysis of the relationship between a text and a different version of the same text—what I have called a parallel text.[73] As previously noted, critics accuse both colorization and 3D conversion of desecrating an "original" text for financial gain, with these practices enabling the film to be repurposed for new formats and ancillary markets. However, instead of

[72] Ian Failes, "Back into the danger zone: *Top Gun* 3D," *fx guide*, February 8, 2013, http://www.fxguide.com/featured/back-into-the-danger-zone-top-gun-3d/.

[73] Jason Gendler, "Are My Eyes Really Brown? The Aesthetics of Colorization in *Casablanca*" in *Color and the Moving Image: History, Theory, Aesthetics, Archive*, ed. Simon Brown, Sarah Street, and Liz Watkins (New York: Routledge, 2012), 199-210.

detailing the perceived sins of colorization, Gendler focuses on a comparative analysis of the original black-and-white *Casablanca* (1942) and its 1988 colorized counterpart to better understand the aesthetics of the updated text. Gendler thus studies the colorized *Casablanca* in what he calls a "spirit of open-mindedness," and it is a similar open-mindedness with which I approach the 3D conversions of both new releases and library titles.[74] My work differs from Gendler's in that his focus is squarely on aesthetics, whereas aesthetics and film style are only part of my larger argument on the creative labor of 2D-to-3D conversion practitioners.

In relation to 2D-to-3D conversion and film form, I also draw on David Bordwell's conceptualization of ordinary films and stylistic norms. In *The Way Hollywood Tells It: Story and Style in Modern Movies*, a study of contemporary narrative film form and style, Bordwell argues that other scholars' problematic conceptualizations of a "post-classical" aesthetic rely on exceptional examples.[75] My study adopts Bordwell's interest in the "ordinary" or typical film by shifting the focus from acclaimed native 3D films to 3D conversions, which constitute a larger percentage of mainstream feature-length stereoscopic films. However, I depart from his work by foregrounding the specifics of technical and creative labor in the production process.[76] Indeed, if Bordwell tends to discuss industrial forces in support of an argument about textual style, my dissertation reverses his focus and largely use aesthetics to better characterize the creative labor

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[74] Gendler, "Are My Eyes Really Brown," 200.

[75] David Bordwell, *The Way Hollywood Tells It: Story and Style in Modern Movies* (Berkeley: University of California Press, 2006).

[76] Kristin Thompson, Bordwell's frequent collaborator, foregrounds a wide variety of practitioners in her research on *The Lord of the Rings* franchise. Thompson's book features interviews with and mentions of below-the-line personnel including (but definitely not limited to) Matt Aitken, digital models supervisor; Stan Alley, props standby assistant; Ngila Dickson, costume designer; Sharon James, motion-capture combat choreographer; and Ken Saville, sound recordist. However, Thompson frames her work as a "book-length history," and indeed, the book focuses largely on recording the story of the film's production and reception. It does not seek to make a critical cultural argument about these processes, one of my primary intentions here. Kristin Thompson, *The Frodo Franchise:* The Lord of the Rings *and Modern Hollywood* (Berkeley: University of California Press, 2007), 8, 41-42, 63, 188, 241-243, 306, 307.

of 2D-to-3D conversion workers. As discussed in the previous section of this literature review, professional critical discourses tend to prioritize directors or showrunners as authors to legitimize media forms, and it important to note that scholars (including Bordwell) often attribute the film's aesthetics solely to the director rather than to below-the-line workers. For example, writing on contemporary visual style in *The Way Hollywood Tells It*, Bordwell characterizes Johnnie To's direction in *A Hero Never Dies* (1998) as artistically motivated, suggesting that To "gives us tight, brief close-ups and a languidly arcing camera."[77] The notion of the director "giving us" anything undercuts not only the presence but also the agency of the cinematographer, the camera operator, the editor, and everyone else involved in the artistic process. Style and creative labor must be considered in conjunction with each other, but to privilege one too strongly results in a simplification of the other.

Instead of adopting a director-centric approach to film style that reifies the text as a cohesive formal system, I follow Turnock's production-centric approach that acknowledges films as sites of both industrial and aesthetic contestation. Turnock acknowledges how special effects work can contradict and complicate the ostensible vision of the film director. Analyzing the specific manifestation of special effects workers' creative labor in the original *Star Wars* (1977), Turnock argues that "the result achieves the spirit of what [George] Lucas wanted, but with a rougher and bumpier technical imperfection than desired. Instead, however, visual kineticism, pace, and rhythm take precedence."[78] In essence, Turnock acknowledges that film form does not simply reflect the vision of a director but often is the result of negotiation between practitioners who have different roles in the filmmaking process. *Plastic Reality* thus

[77] Bordwell, *The Way Hollywood Tells It*, 181.

[78] Turnock, *Plastic Reality*, 172.

demonstrates how scholarly work such as my own can engage film aesthetics in a manner that reveals the complexities of production and challenges popular notions of authorship and aesthetic value.

Cinema Studies and 3D

These scholarly works on film form and aesthetics provide the foundation upon which I consider 2D-to-3D conversions in relation to contemporary 2D film aesthetics and, in the case of Gendler's work, to other types of creative labor that produce parallel or reformatted texts. Given that my study of the 2D-to-3D conversion's form necessitates an understanding of the negotiation between 2D and 3D aesthetics, I also carefully consider the preexisting scholarship on 3D cinema, its formal properties, and its spectatorial address. In this regard, I see my research as making an intervention in the subfield of scholarly work specifically focused on 3D film, whether shot with 3D cameras or converted in post-production. Despite the recent increase in scholarship on the subject, 3D cinema still receives little attention in cinema and media studies, and conversion is often neglected in arguments about stereoscopic film more broadly.[79] Thus, my dissertation on 2D-to-3D conversion contributes to this growing body of scholarship by addressing these oversights related production practice and cultural value, in doing so, I also hope to expand the range of films we study to understand 3D filmmaking.

As previously mentioned, my research on 2D-to-3D conversion shifts cinema and media studies' focus away from exemplary and canonical 3D films. A handful of 3D texts (many helmed by popularly respected director-authors) appear repeatedly as case studies of 3D

[79] For examples of relatively recent special issues dedicated to 3D, see Kristen Whissel, ed., "Genealogical and Archeological Approaches to 3-D," special issue, *Film Criticism* 37, no. 3 and 38, no. 1 (2013); Dan Adler, Janine Marchessault, and Sanja Obradovic, eds., "3D Cinema and Beyond," special issue, *Public* 47 (2013).

aesthetics. Ariel Rogers's *Cinematic Appeals: The Experience of New Movie Technologies* and Miriam Ross's *3D Cinema* both use the stereoscopic films *Creature from the Black Lagoon* (1954) and *Avatar* as central examples.[80] Sheldon Hall's 2004 *Film History* essay and Ross's *3D Cinema* both examine Alfred Hitchcock's *Dial M for Murder* (1954), which for the most part did not even screen in 3D upon initial release.[81] Barbara Klinger's 2012 *Film Quarterly* essay and Ross's book both consider European auteur Werner Herzog's documentary *Cave of Forgotten Dreams*.[82] And Scott Higgins's 2012 *Film History* article and Ross's *3D Cinema* and both use Martin Scorsese's Academy Award-winning *Hugo* as a key text.[83] Although there are references to other 3D films, by drawing again and again upon such a narrow sample of respectable, "director-driven" movies, current 3D scholarship suggests that what have become "canonized" texts provide the most useful avenues for thinking about 3D cinema.

Furthermore, all of the film examples I have listed here (and almost all other key examples I have encountered) are native 3D, shot with 3D cameras. None were converted from 2D in post-production by three main conversion companies: DNEG, Legend3D, or Stereo D. Ross's *3D Cinema*, which focuses on 12 case studies, examines only one contemporary 3D conversion, *Iron Man 3* (Stereo D cr., Gener8, uncr., 2013), and she does not discuss how the

[80] Ariel Rogers, *Cinematic Appeals: The Experience of New Movie Technologies* (New York: Columbia University Press, 2013); Ross, *3D Cinema*.

[81] Further, Delia Enyedi discusses *Dial M for Murder* alongside Jean-Luc Godard's *Goodbye to Language* (2014) to suggest how the directors "contribute to the foundation of an auteur aesthetic in 3D filmmaking." John Belton, ed., "3-D Cinema," special issue, *Film History* 16, no. 3 (2004): 243-255; Ross, *3D Cinema*, 18-46; Delia Enyedi, "Auteur 3D Filmmaking: From Hitchcock's Protrusion Technique to Godard's Immersion Aesthetic," *International Scholarly and Scientific Research & Innovation* 11, no. 3 (2017): 649-653.

[82] Barbara Klinger, "Cave of Forgotten Dreams: Meditations on 3D," *Film Quarterly* 65, no. 3 (Spring 2012): 38-43; Ross, *3D Cinema*, 95-125.

[83] John Belton, ed., "Digital Cinema," special issue, *Film History* 24, no. 2 (2012): 196-209; Ross, *3D Cinema*, 47-71.

conversion process complicates our understanding of 3D aesthetics.[84] Indeed, in a *Cinema Journal* essay entitled "Variation within Stability: Digital 3D and Film Style," Nick Jones explicitly references the distinction between native 3D and converted 3D to explain his case studies.[85] Describing how he chose his examples, Jones indicates that the films "make 3D an integral aspect of their production, shooting for the most part in 'native' 3D (rather than post-converting 2D footage)."[86] Thus, in both selection and language, scholarship on 3D cinema has tended to overlook 3D conversion.

Despite making this clear distinction between native and converted 3D in his 2015 article, Nick Jones has since expanded on his research of stereoscopic cinema by additionally theorizing films converted into 3D. Most notably, Jones dedicates a chapter of his 2020 book on digital 3D cinema to analyzing resemblances between 3D conversion processes and surveillance practices.[87] Jones also explores 3D conversion in a 2018 analysis of Ron Howard's *In the Heart of the Sea* (Prime Focus ver., 2015). In this earlier essay, Jones writes that the conversion for *In the Heart of the Sea* "offers a sustained, experimental, and ultimately exciting use of" stereoscopic 3D.[88] He argues that stereoscopic 3D, like any representation, "distorts" our perception of the world.

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[84] Miriam Ross discusses both *Iron Man 3* and *The Amazing Spider-Man 2* (Legend3D cr., Prime Focus uncr., 2014) in a 2016 article but, again, does not specifically address the implications of the films being converted. Miriam Ross, "Transformative Bodies in 3D Cinema: Computer Generated Morphing and Extra-sensory Depth Cues," in *The Aesthetic and Narrative Dimensions of 3D-Film*, ed. Markus Spöher (Berlin: Springer VS, 2016), 123-136.

[85] Nick Jones, "Variation within Stability: Digital 3D and Film Style," *Cinema Journal* 55, no. 1 (Fall 2015): 52-73.

[86] Jones, "Variation within Stability," 54-55.

[87] In addition to centering 3D conversion for Chapter 5, Jones analyzes *Clash of the Titans* (Prime Focus cr., 2010) in Chapter 7 alongside a much more critically regarded use of 3D, Jean-Luc Godard's *Goodbye to Language* (2014). Jones, *Spaces Mapped and Monstrous*, 115-139, 184-190.

[88] Nick Jones, "L'illusion partielle de la 3D: distorsions spatiales, stéréoscopie et *Au Coeur de l'océan*," in *Stéréoscopie et Illusion*, trans. Frank Boulège, eds. Esther Jacopin and Giusy Pisano (Paris: Septentrion Universitary Press, 2018), 213–227. Any citations of this work apply to the author's original English version, provided courtesy of Jones. Title in English is "3D's Partial Illusion: Spatial Distortions, Stereoscopy and *In the Heart of the Sea*."

However, 3D's status as being "historically less culturally visible" renders the medium a more "overt" departure from everyday perception, as its images have not been normalized as "realistic" in the same way as those in 2D film. For *In the Heart of the Sea*, such distortion specifically manifests itself in "space which is rendered monstrous and menacing, consuming and confusing."[89] Jones thus shows how we can seriously engage with 3D conversion on a scholarly level, despite its perception as culturally suspect. Notably, Jones does not address the film's status as converted 3D until near the end of this essay. By contrast, I foreground 3D conversion as central to my study, both to make sense of its precarious cultural status and to better understand the specifics of conversion as a production practice.

My research contributes to cinema and media scholarship on 3D not only by further broadening the scope of the films we consider but also by foregrounding the industrial and cultural dimensions of contemporary 3D cinema. While most scholarship on 3D briefly references these contexts, these existing studies typically use these perspectives as entry points for arguments primarily concerned with embodiment, spectatorial address, and/or digital culture more broadly. Thomas Elsaesser paraphrases how critics have denigrated contemporary 3D as pure profit-seeking: "The new gimmick in fact turned out to be an old gimmick that had already been short-lived the first time around, but because Hollywood does not have a memory, or is out of fresh ideas, 3-D tried again and failed again."[90] He touches upon this and related narratives to offer a counternarrative, one that explores 3D cinema's place in contemporary visual culture to

[89] Stereo D's Graham D. Clark has similarly noted both stereoscopic 3D and other representational forms as interpretations of reality: "For both native and conversion, the presentation is on a 2D plane at a different size than you see stuff in real life, and with different lensing, so we have to reinterpret it just like painters or somebody who is drawing with a pencil on paper have to reinterpret the view that is in front of their eyes onto that 2D plane." Jones, "L'illusion partielle de la 3D: distorsions spatiales, stéréoscopie et *Au Coeur de l'océan*"; Tricart, *3D Filmmaking*, 86.

[90] Elsaesser, "The "Return" of 3-D,"

ask theoretical questions about space, time, embodiment, and image. Ross references how some critics "[suggest] that 3D cinema can never be more than a passing fad and, by insinuation, [suggest] that it is somehow not true cinema." However, her study primarily addresses how stereoscopic cinema "operates as a visual format that has its own governing principle and is distinct from other visual processes."[91]

In essence, my study centers some of these basic premises about 3D's perceived economic function and cultural value that other scholars have primarily used as mere pretext for their research on stereoscopic cinema. I do so to explicitly deconstruct these historically situated discourses about 3D and, against the grain of these logics, open alternate avenues for thinking about stereoscopic filmmaking. By analyzing practitioners' theories about their work alongside histories of how critics and audiences have understood the essence and creative (il)legitimacy of cinema, I demonstrate how the cultural denigration of an industry practice such as 3D conversion can both stem from and exacerbate misunderstandings, or non-consideration, of creative labor. Put differently, my synthesis of scholarly approaches concerning production, cultural status, and aesthetics uniquely allows us to reconsider modes of production otherwise dismissed as "bad objects."

[91] Ross, *3D Cinema*, 4.

Chapter 1

A Bad Object (re)Emerges: The Debates Over 2D-to-3D Conversion's Cultural Status

This first chapter will establish the main players in the story of 2D-to-3D conversion and explore the debates over 3D's artistic and cultural status. While the focus for this chapter will be the contemporary era of digital 3D, which started around 2009 and continues to the present, I start by exploring possible historical precedents for how people understand 3D today. More specifically, I discuss how audiences have been theorized in relation to 3D and other film technologies historically associated with spectacle. In essence, I focus on how emerging film technologies of the past, including previous iterations of 3D, have inspired debates over their relationships to moviegoers (often theorized as passive spectators) and cultural debates regarding how developments are consistent or in disagreement with norms of cinema as entertainment and art. Indeed, each chapter in this dissertation will begin by briefly sketching out historical and scholarly frameworks relevant to the topics to be discussed. I do so to underline how 3D conversion becomes but one specific site of longstanding debates about cinema.

I follow this historical context with an exploration of how Hollywood trade reporters and popular film critics discussed the digital 3D boom in 2009 and 2010. While much of this section covers issues specific to 3D conversion, I expand to talk about 3D more broadly. Indeed, 3D skeptics often uphold 3D conversion as but one particularly odious subset of 3D, itself culturally suspect as financially motivated gimmick. This survey of the public debates around 3D includes an examination of how the "Death of 3D" recurs as a trope in skeptical 3D coverage, beginning almost as early as digital 3D's advent. In essence, the first half of this chapter establishes some of the institutional and discursive contexts that affect how 3D conversion professionals make

sense of their work to themselves and to others.

If the first half of this chapter establishes the dominant narratives concerning digital 3D and 2D-to-3D conversion, the second half focuses on the counter histories and discourses of the conversion companies themselves. Here, I briefly sketch the early history of the main four 3D conversion companies, and I analyze the professional self-theorizing of creative workers at 2D-to-3D conversion companies. I identify tropes in the now-defunct website of Prime Focus, which regularly published individual pages dedicated to particular 3D conversion projects (fig. 1). These pages featured production details and quotes from key personnel that attempted to legitimize 3D conversion as a creative process, often in ways that challenged the dominant discourses sketched out in the first half of this chapter. Further, I build on my analysis of Prime Focus's website with quotes from my original interviews with key personnel representing the major 3D conversion companies. 3D conversion professionals take various approaches to rationalizing their work, whether that be highlighting the intense labor required, referencing collaborations with 2D filmmakers, or theorizing in broader terms that speak to questions of how we define cinema.

It might seem odd that the first chapter in a dissertation about 3D conversion does not delve deeply into 3D conversion itself until its second half. But put another way, this chapter explores what Stereo D's Aaron Parry unequivocally identified as the "number one challenge" for 3D conversion: "Perception." As he elaborated, Stereo D had to convince filmmakers that conversion was an "amazing storytelling tool" that could "enhanced their storytelling."[1] Thus, I argue that it is essential to properly contextualize practitioners' characterizations of their work within the larger historical, discursive, and theoretical forces that shape and inform them.

[1] Aaron Parry, in interview by the author, Burbank, California, June 10, 2019.

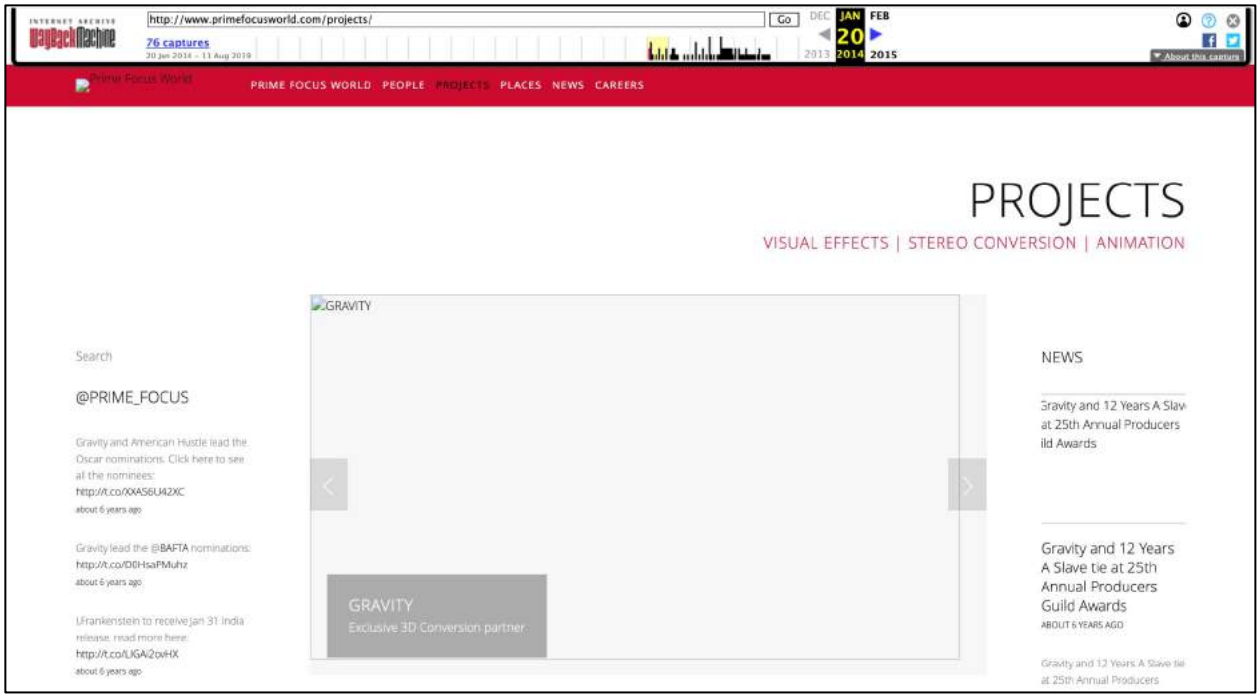

Figure 1: As captured on January 20, 2014, Prime Focus's now-defunct "Projects" page linked to film-specific web pages with information about the conversion process and quotes from creative personnel. Source: "Projects," Prime Focus, January 20, 2014, accessed February 19, 2020, Wayback Machine Internet Archive, https://web.archive.org/web/20150317151809/http://www.primefocusworld.com/about/.

A Familiar Novelty: Histories of 3D's Cultural Legitimacy

Mainstream conceptions of contemporary 3D as commercial gimmick and artistic joke are far from new.[2] Writing about recurring associations of new electronic media with the paranormal, Jeffrey Sconce argues that "familiar stories" will "appear in new incarnations with the advent of each new medium," and similarly, the discourses surrounding digital 3D echo historical anxieties about earlier iterations of 3D and related cinematic practices.[3] I argue that scholarly and popular understandings of 3D cinema's past, particular its 1950s iteration, inform

[2] Although this section focuses on how specific technological changes have historically prompted cultural negotiations of cinema's status as business and/or art, the tension between the economics and artistry of cinema has been formative for the industry more broadly. For example, when the Supreme Court ruled in 1915 that motion pictures represented a "business pure and simple," the United States declared that cinema was not protected by the First Amendment. Lee Grieveson, *Policing Cinema: Movies and Censorship in Early-Twentieth-Century America* (Berkeley: University of California Press, 2004).

[3] Jeffrey Sconce, *Haunted Media: Electronic Presence from Telegraphy to Television* (Durham: Duke University Press, 2000), 8.

the perception of digital 3D. This first section will briefly explore the industrial context of 3D in 1950s Hollywood, which includes reference to competing film technologies such as widescreen. Scholars have framed these emerging film technologies as coming into public view during moments of industrial crisis, such as the advent of television or digital media. Some of these histories frame technologies widescreen cinema as more consistent with the norms of classical Hollywood invisibility, consistent with the popular understandings of 3D as excessive and unartistic.[4]

Although this section focuses primarily on historical discourses surrounding widescreen and 3D, I acknowledge that filmmakers throughout moving image history have alternately amplified and moderated the novel, often spectacular, elements of numerous emerging technologies. In his history of Technicolor, Scott Higgins notes that "before the 1930s, color tended to offer novel embellishment or, as in the case of tinting, a simple and expedient method of signification."[5] By contrast, Higgins positions Technicolor in terms of "far-reaching attempts to harness color to narrative," as the studios of the 1930s "tempered color's novelty and developed practical methods for managing it."[6] Similarly, John Belton frames two-color Technicolor in the 1920s in terms of the "anxieties that surround the introduction of a new motion-picture technology."[7] Even more broadly, Charles Musser has characterized the post-1901 period of early cinema as one of "increasing narrative integration," suggesting how the

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[4] David Bordwell, Janet Staiger, and Kristin Thompson. *The Classical Hollywood Cinema: Film Style & Mode of Production to 1960* (New York: Columbia University Press, 1985).

[5] Scott Higgins, *Harnessing the Technicolor Rainbow: Color Design in the 1930s* (Austin: University of Texas Press, 2007), 5

[6] Higgins, *Harnessing the Technicolor Rainbow*, 5.

[7] John Belton, "'Taking the color out of color': Two-Colour Technicolor, *The Black Pirate* and Blackened Dyes," in *The Colour Fantastic: Chromatic Worlds of Silent Cinema*, ed. Giovanna Fossati, Victoria Jackson, Bregt Lameris, Elif Rongen-Kaynakçi, Sarah Street, and Joshua Yumibe (Amsterdam: Amsterdam University Press, 2018), 98.

technology of *film* was once a spectacle to be managed and mobilized toward a goal other than the spectacle itself.[8] Thus, there are many possible historical precedents for the cultural and aesthetic anxieties surrounding 3D conversion. Still, I foreground widescreen and 3D here because they are most proximate to the cultural perception of 3D conversion and digital 3D more generally, and future research can further explore how we might conceive of 3D conversion in relation to these other cinematic technologies.

Film historians have framed the 3D boom of the 1950s as one attempt by the Hollywood studios to differentiate its product from emerging competitors.[9] For instance, William Paul frames both 3D and widescreen exhibition in the 1950s as attempts to differentiate cinema from television.[10] This account is in part supported by primary sources from the time. In a 1953 letter to John Huston explaining the pros and cons of systems such as Natural Vision 3D and CinemaScope, agent and producer Paul Kohner expresses that, "the industry heads are worried to death by the inroads television has been making and have been frantically casting about for ways and means to meet this overwhelming threat to the nation's theatres and box offices."[11] Disparate technological processes were so intertwined that mainstream and trade journalists of the time conflated 3D and widescreen processes.[12] That is, these technologies were not positioned as wholly distinct from each other but rather as equivalent alternatives for an enhanced cinematic

[8] Charles Musser, "Rethinking Early Cinema: Cinema of Attractions and Narrativity," in *The Cinema of Attractions Reloaded*, ed. Wanda Strauven (Amsterdam: Amsterdam University Press, 2006), 389-416.

[9] In this section, I focus on how existing scholarship characterizes 3D in relation to 1950s Hollywood, but I want to briefly note Keith M. Johnston's exploration of 3D in the context of British exhibition. Keith M. Johnston, "Now is the time (to put on your glasses): 3-D film exhibition in Britain, 1951-55." *Film History* 23, no. 1 (2011): 99-103.

[10] Paul, "The Aesthetics of Emergence."

[11] Paul Kohner to John Huston, 26 March 1953, John Huston papers, 105.f-1161, Margaret Herrick Library, Academy of Motion Picture Arts and Sciences, Beverly Hills, CA (hereafter Margaret Herrick Library).

[12] Rogers, *Cinematic Appeals*, 23, 31-32.

experience. According to *Variety* in 1951, Cinerama claimed "a third-dimension effect rather than an actual picture with depth."[13] While ostensibly differentiating itself, Cinerama was defined in terms of 3D. Similarly, in a 3D misnomer, *The Wall Street Journal* discussed the "Cinemascope 3-D process" as an alternative to Natural Vision, despite CinemaScope being a non-3D widescreen format.[14] It less important here whether these technologies were or were not actually different; it is more important to understand the public and industrial perception of their interrelatedness. 3D cinema was understood less for the specifics of its technology and its aesthetic properties and more for its general effect on audiences and as a method of product differentiation.

It is important to note that although 3D and competing widescreen technologies came to the fore in 1950s Hollywood, the stories of these technologies extend far before Hollywood's attempt to differentiate itself from television. John Belton explicitly challenges such monolithic conceptions of technology in his history of widescreen: "Cinerama, CinemaScope, and other widescreen systems did not emerge magically from the head of Hollywood; their success in the mid-1950s did not occur in a historical vacuum but against a background of earlier failure." To highlight this ignored history, Belton instead traces widescreen cinema to earlier developments, including the studios' 1920s "wide-film revolution" and "large-screen" projections as early as 1896.[15] Similarly, although 3D historian Ray Zone begins *3D Revolution: The History of Modern Stereoscopic Cinema* with the 1950s, he dedicates another book entirely to the developments that

[13] "Majors No Like Specs For Third Dimension; Big Push for It Goes On," *Variety*.

[14] Twentieth Century-Fox Plans Two 3-Dimension Films in Natural Vision," *The Wall Street Journal*, 5 February 1953, 10, http://search.proquest.com/docview/132042761?accountid=14512.

[15] John Belton, *Widescreen Cinema* (Cambridge: Harvard University Press, 1992), 5.

preceded this well-noted Hollywood boom.[16] Thus, my point in emphasizing the historical role of 3D and widescreen in the 1950s is not meant to reify this moment as an absolute beginning but is rather designed to highlight how the dominant *perception* of these technologies' histories resonates with the popular discourses around digital 3D to be explored in the next section.

In the 1950s, the Hollywood studios even toyed with the possibility of reformatting films already shot "flat" for the era of 3D and widescreen films.[17] In 1953, *Variety* reported how Paramount and Warner Bros. had both experimented with an optical process which would aid in "the salvaging of an estimated $350,000,000 backlog of so-called 'flat' pictures."[18] Further, if the technology proved successful, studios would also implement the process with "selected reissues of some of the top pix of past years."[19] While this appears to have been an approach that was largely abandoned, this detail provides a crucial antecedent to the industry decisions in the age of 2D-to-3D conversion. In both the 1950s and the 2010s, Hollywood sought to update their

[16] Ray Zone, *3D Revolution: The History of Modern Stereoscopic Cinema* (Lexington: University Press of Kentucky, 2012); Ray Zone, *Stereoscopic Cinema and the Origins of 3D Films* (Lexington: University Press of Kentucky, 2007).

[17] I will further elaborate my concept of parallel texts in Chapter 2, but I will emphasize here how different iterations of given films often emerged at moments of technological change in film history. In the early sound era, studios produced multiple-language versions of films to address the challenges that dialogue presented for international audiences speaking different languages. While multiple-language versions were most common in the early sound era, they were not exclusively produced during that period. For example, Jean Renoir filmed three different versions of *The Golden Coach* (1952), and much more recently, Joachim Ronning and Espen Sandberg shot both Norwegian and English versions of their Oscar-nominated *Kon-Tiki* (2012). I do not have enough room here to fully account for scholarship on translation in audiovisual media, but for examples of research that explicitly deal with multiple-language versions of films, see Ginette Vincendeau, "Hollywood Babel," *Screen* 29, no. 2 (1988): 24-39; Abé Mark Nornes, *Cinema Babel: Translating Global Cinema* (Minneapolis: University of Minnesota Press, 2007); Chris Wahl, *Multiple Language Versions Made in Babelsberg: Ufa's International Strategy, 1929-1939* (Amsterdam: Amsterdam University Press, 2015); Larry Rohter, "Can You Say 'Do It Again' in Norwegian?," *The New York Times*, April 12, 2013, https://www.nytimes.com/2013/04/14/movies/two-versions-of-kon-tiki-in-two-different-lanugages.html.

[18] "Industry Watches Par, WB Efforts to Salvage 'Flat' Pix for 3-D Era," *Daily Variety*, February 9, 1953.

[19] "Industry Watches Par, WB Efforts to Salvage 'Flat' Pix for 3-D Era," *Daily Variety*.

product to satisfy a thirst for 3D content by producing both new titles yet to be released and classic titles for a new ancillary revenue.

If 3D and widescreen emerged alongside each other as similar but competing technologies, the latter emerged as the clear victor in the battle. John Belton writes how "technological innovations, such as 3D, never progressed beyond the status of novelty items," but "widescreen, like sound and color, transformed the face of the cinema, establishing a new set of technological and aesthetic norms."[20] The 3D fad, with hits such as *Bwana Devil* (1952) and *House of Wax* (1953), was followed by a swift bubble burst, with Alfred Hitchcock's *Dial M for Murder* (1954) largely screened in 2D despite being shot stereoscopically. On the other hand, widescreen remains the industry norm, with only occasional art films employing non-wide aspect ratios.[21]

Although there is not enough space here to detail the various industrial, technical and sociocultural reasons why widescreen became standard while 3D remained a gimmick, I wish to emphasize how historians and critics have attributed 3D's downfall to the aesthetically questionable nature of the emergence effects, of objects popping from the screen. Contrasting 1950s widescreen and 1950s 3D, Ariel Rogers concludes that while "widescreen was promoted as offering viewers an experience of immersion in the cinematic spectacle, drawing the viewer into exotic worlds and experiences, stereoscopic 3D often functioned according to the logic of emergence, *assaulting* viewers [emphasis added]."[22] William Paul suggests that these disparate

[20] Belton, *Widescreen Cinema*, 12.

[21] Recent examples of prestige or art films using non-wide aspect ratios include *The Artist* (2011), *The Lighthouse* (2019), and *Laurence Anyways* (2012). I would also note that the first two films are also in black-and-white, reinforcing these films' use of historical film technologies.

[22] Ariel Rogers, *Cinematic Appeals: The Experience of New Movie Technologies* (New York: Columbia University Press, 2013), 197.

appeals are precisely why 3D was not seen as artistically or creatively legitimate. While the immersive possibilities of widescreen could be likened to theater and traditional ways of understanding cinematic storytelling, 3D "could offer no such 'legitimacy' because it placed the audience in a different relationship to the screen, and in so doing it *inscribed* a different audience than Cinerama and other widescreen processes."[23] That is, widescreen technologies appeared more consistent with the norms of classical Hollywood cinema as invisible storytelling.[24] 3D cinema's aberrational cultural status is not the only possible explanation for why the technology failed to gain traction in the 1950s, and crucially, film historians such as Tom Gunning have theorized a "cinema of attractions" to problematize the centrality of invisibility and narrative in film histories.[25] However, especially in popular film discourses, the notion of 3D emergence as

[23] Paul, "The Aesthetics of Emergence," 337-338.

[24] Some 3D films coupled negative parallax with explicit, self-aware acknowledgements of the audience. A January 1953 screenplay for Warner Bros.'s *House of Wax* scripts the audience into the text. In one of the "dimensional effects" described, "the chair comes hurtling toward the camera, through the frame and toward the audience." Such direct address denies much of what film studies has concluded about the invisibility of Classical Hollywood Cinema and the denial of the audience. Thomas Elsaesser and Malte Hagener suggest that "in the classical cinema, the spectator is an invisible witness – invisible to the unfolding narrative that does not acknowledge his/her presence." Similarly, in "Visual Pleasure and Narrative Cinema," Laura Mulvey assumes that the cinema's ideological effects are enabled by the denial of both the camera's perspective and the audience's perspective in favor of a character's perspective. *House of Wax* final screenplay, dated 14 and 15 January 1953, p. 13, M.L. Gunzburg papers, folder 1t.f-1, Margaret Herrick Library; Thomas Elsaesser and Malte Hagener, *Film Theory: an introduction through the senses* (New York and London: Routledge, 2010), 18; Laura Mulvey, "Visual Pleasure and Narrative Cinema," in *Narrative, Apparatus, Ideology: A Film Theory Reader*, ed. Philip Rosen (New York: Columbia University Press, 1986), 208.

[25] Brooks Landon uses Tom Gunning's conception of "attractions" to reframe all early cinema as "science fiction," for the awe inspired by cinema-as-special effect. Similarly, Scott Bukatman discusses how special effects, especially in science fiction, "redirect the spectator to the visual (and auditory and even kinaesthetic) conditions of the cinema, and thus bring the principles of perception to the foreground of consciousness." Most relevant to this project, Leon Gurevitch positions the early stereograph as a "precursor to the 'cinema of attractions.'" Tom Gunning, "The Cinema of Attraction[s]: Early Film, Its Spectator and the Avant-Garde," in *The Cinema of Attractions Reloaded*, ed. Wanda Strauven (Amsterdam: Amsterdam University Press, 2006), 381-388; Brooks Landon, "Diegetic or Digital? The Convergence of Science-Fiction Literature and Science-Fiction Film in Hypermedia," in *Alien Zone II: The Spaces of Science Fiction Cinema*, ed. Annette Kuhn (London: Verso, 1999), 31-32; Scott Bukatman, "The Artificial Infinite: On Special Effects and the Sublime," in *Alien Zone II*, 254; Leon Gurevitch, "The Stereoscopic Attraction: Three-Dimensional Imaging and the Spectacular Paradigm 1850–2013," *Convergence* 19, no. 4 (2013): 396-405.

obtrusive gimmick persists today, informing how contemporary critics and 3D companies see their own work.

If the stereoscopic cinema of the 1950s was understood as an act of emergence, to its cultural and financial detriment, contemporary 3D has been characterized as instead drawing on the immersive potential previously associated with widescreen technologies.[26] Rogers suggests that Digital 3D is often positioned as "an opportunity for viewers to behold and enter new and exotic spaces."[27] Put another way, Thomas Elsaesser suggests that digital 3D has aspired to become an "invisible rather than visible special effect."[28] Furthermore, if 3D and widescreen were once seen as competing technologies, they are now almost always tied together. With few exceptions, the vast majority of theatrical films are widescreen, so 3D films shot in native 3D or converted in post are adding stereoscopic depth cues to a wide image.

Supporting Roger's and Elsaesser's emphasis on digital 3D as immersive, 3D conversion practitioners explicitly disavow the gimmicky of 3D emergence and, implicitly, distance themselves from the perceived mistakes of the past. In a post on Prime Focus's now-defunct website, John Knoll, visual effects supervisor of ILM, explains his work on the stereoscopic conversion of *Star Wars: Episode I – The Phantom Menace* (ver., 2012). Knoll carefully explains that "this isn't a novelty conversion, with things jumping out at the audience; our goal has been to enhance to classic Star Wars theatrical experience."[29] Knoll theorizes the audience's

[26] For a discussion of 3D cinema as an immersive technology from the perspective of a political geographer, see Anna Hamilton Jackman, "3-D cinema: immersive media technology," *GeoJournal* 80 (2015): 853-866.

[27] Rogers, *Cinematic Appeals*, 199, 210.

[28] Thomas Elsaesser, "The 'Return' of 3-D: On Some of the Logics and Genealogies of the Image in the Twenty-First Century," *Critical Inquiry* 39 (Winter 2013), 221.

[29] Post on Star Wars: Episode I - The Phantom Menace, Prime Focus, accessed 10 May 2014, http://www.primefocusworld.com/star-wars-1-2-3.

relationship to the film to articulate the legitimacy of the *Star Wars* conversion in comparison to the sort of effects that connote 1950s 3D. In their work on television, Newman and Levine have argued that contemporary "Quality TV" has strategically legitimated itself by distancing itself from and denigrating the low cultural status of its own past.[30] Similarly, 3D has become (more) legitimate by adopting the discourses historically associated with widescreen cinema, rather than the aesthetically discredited 3D of the past. In Chapter 3, I will explore in further detail how 3D emergence figures into critical evaluations of 3D conversions.

As savvy as this strategy might be, this embrace of a more nuanced approach to 3D puts 3D in a bind. 3D filmmakers might effectively legitimate their work, in part, by rendering their work less visible, as more consistent with the norms of classical Hollywood. But at the same time, the work risks becoming not visible enough to be considered more than an add-on. This specific contradiction has been highlighted in relation to other media technologies. In her history on color television, Susan Murray draws parallels between the development of color television and the preceding history of color film in terms of a tension between a technology announcing itself as novel, on one hand, and assimilating with preexisting industrial and aesthetic norms, on the other. Murray draws on David Bordwell's work to comment on the "double bind" of film technologies: "If color was artificial or unnatural then audiences would notice and complain; but, the studio heads argued, if color blended in seamlessly then it would not be *sufficiently* noticed and therefore not worth the cost."[31] Murray specifically references critiques of Technicolor as too artificial, and TV industry debates in the 1950s concerning how to best apply color to broadcasting practices. For 3D, filmmakers have to similarly choose between a subtler 3D

[30] Newman and Levine, *Legitimating Television*.

[31] Susan Murray, *Bright Signals: A History of Color Television* (Durham: Duke University Press, 2018), 104; Bordwell, Staiger, and Thompson, *The Classical Hollywood Cinema*.

aesthetic, one that might make a three-dollar surcharge on a movie ticket seem excessive, and a more emergence-heavy approach that runs the risk of limiting its broader cultural acceptance.[32]

This double bind of 3D filmmakers also represents another specific instance of below-the-line workers' paradoxical situation. That is, on one hand, cinematographers, costume designers, production designers, and the like sublimate themselves to the power of the director, whose singular vision has historically legitimated cinema as an expressive artform. On the other hand, these crafts also want to assert their own creativity autonomy so they themselves can lay claim to the luster of artistic expression. In the span of an edited four-minute video about Gener8, compositing director Mel Best first says, "the really cool thing about being a compositor is if you do a really good job, you're never going to see what we've done. It's invisible work behind the scenes."[33] She then goes on to comment how "it's a creative outlet. You can't do that crunching numbers or something like that … you have passion as an artist."[34] This is the tension between not wanting the work to be seen but also wanting to have a voice, which Hye Jean Chung discusses with relation to discourses of seamlessness with digital effects.[35] This personal desire to be heard but not seen thus parallels the historically informed push for 3D cinema to be

[32] Miklós Kiss writes about 3D in a manner that echoes this recurring tension between novelty and naturalism/realism: "One could argue that the simplest and also biggest threat for cinematic 3D is that, with time, its (visual) *novelty* wears off. This idea, according to which the initial attraction of 3D imagery will inevitably fade away, implicitly suggests a very important point: if the stereoscopic look is considered as visual *attraction* instead of having the ecological potential of bringing cinematic perception closer to natural vision, then its technique remains one which *adds to* that attraction rather than one that *inherently perfects* the cinematic illusion." Miklós Kiss, "3D Imaging Technology's Narrative Appropriation in Cinema," in *Exposing the Film Apparatus: The Film Archive as a Research Laboratory*, ed. Giovanna Fossati and Annie van den Oever (Amsterdam, Amsterdam University Press: 2016): 317.

[33] STORYHIVE, "myVancouver Gener8 Media: Converting 2D to 3D Film," YouTube video, 3:55, July 15, 2013, https://www.youtube.com/watch?v=P5APlzaPngs.

[34] STORYHIVE, "myVancouver Gener8 Media: Converting 2D to 3D Film."

[35] Hye Jean Chung, *Media Heterotopias: Digital Effects and Material Labor in Global Film Production* (Durham: Duke University Press, 2018).

noticeable enough to be worth the surcharge but not visible enough to dredge up memories of headaches and eyestrain from the 1950s or 1980s.

Indeed, the industry's push to legitimate 3D addressed not only emergence but also anxieties about adverse health effects. In a *Time* article, DreamWorks's Jeffrey Katzenberg dismisses the 3D of days past to reassure audiences that today's 3D will not make them sick, specifically joking that "making your customers sick is not a recipe for success."[36] The article contextualizes Katzenberg's enthusiasm for 3D, the sort used in his own animation studio's films, by painting a negative portrait of 3D in days past: "Viewers often wore cardboard glasses with red and cyan cellophane lenses … As just about everyone knows, old-school 3-D was less than awesome. Colors looked washed out. Some viewers got headaches. A few vomited."[37] Scholars such as William Paul have commented on these negative physiological impacts with earlier iterations of 3D. Paul notes that "the separate strips of film were constantly getting out of alignment, often causing more headaches than extra dimensions."[38] Once again, a 3D advocate acknowledges the failures of 3D in the past in an effort to boost the perception of 3D in the present.

The section above has sketched a possible genealogy for how contemporary industry professionals, popular critics, and audiences understand 3D. While individuals today might not be familiar with the details of such historical accounts, I still see them as important background for the tropes that persist in how we talk about 3D. If this section has focused on the industrial contexts for 3D's past, the next section will focus on the specific developments in Hollywood

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[36] Josh Quittner, "The Next Dimension," *Entertainment Blog*, March 24, 2009, http://entertaining-blog.blogspot.com/2009/03/next-dimension.html.

[37] Quittner, "The Next Dimension."

[38] William Paul, "The Aesthetics of Emergence," *Film History* 5, no. 3 (1993): 327.

concerning 2D-to-3D conversion and digital 3D more broadly starting around 2010. My analysis of both trade accounts and popular criticism will not only offer a more proximate history of 3D conversion work but also suggest the persistence of the industrial and aesthetic anxieties explored above.

Vote with Your Glasses: The Industry and Critics Debate 3D

First impressions matter, and in a number of ways, 3D did not make for stellar first impressions.[39] This next section will sketch out how trade publications such as *Variety* covered the advent of 3D. In particular, the early focus on 3D in terms of digital projection and box office revenue would later feed into criticism that 3D was financially (and not creatively) motivated. Critics and audiences would largely discuss 3D in terms that emphasized the *quantity* of 3D and perceived added value in relation to the 2D counterpart. Perhaps unintentionally, 3D skeptics viewed 3D conversion in the sort of economically determined logic that they criticized the studios for adopting in the first place. Reducing stereoscopic cinema to a consumer's choice between 2D and 3D versions of a given film, the conversation seemed largely limited to whether 3D should fail or succeed, whether it would live or die.

In the early stages of 3D's contemporary boom, industry insiders and the trades frequently discussed 3D in relation to the switch from celluloid to digital.[40] That is, 3D was the

[39] Sarah Atkinson has referred to what she sees as the "central problem of [3D's] reception." Sarah Atkinson, "Stereoscopic-3D storytelling — Rethinking the conventions, grammar and aesthetics of a new medium," *Journal of Media Practice* 12, no. 2 (2011): 139-156.

[40] I start my industrial analysis with the lead-up to *Avatar*, as this represents the turning point after which 3D conversion became an industry norm. However, I want to stress that stereoscopic filmmaking did not simply disappear between the 1950s and 2009, as Ray Zone extensively details in his history of 3D cinema. Relatedly, Zachary Ingle has written about Robert Rodriguez's *Spy Kids 3-D: Game Over* (2003). Zone, *3D Revolution*; Zachary Ingle, "Robert Rodriguez's Spy Kids 3-D: Game Over and the 3-D Resurgence," *Post Script* 33, no. 3 (Summer 2014): 17-28.

"killer app," the reason for exhibitors to pay the price for the costly upgrade to digital projection. In 2007, more than two years before the release of *Avatar* (2009), *Daily Variety* quoted Warner Bros. International Cinemas President Millard Ochs as saying, "From a distributor's point of view, the whole reason for purchasing digital systems is that I saw what (3-D provider) Real D was capable of doing for the future."[41] In 2009, *Variety*'s report on a virtual print fee deal between Warner Bros. and digital cinema company Cinedigm emphasized "the hopes of accelerating the installation of more 3D screens."[42] David Bordwell even used the word "killer app" to characterize 3D as an incentive for theaters to convert to digital, and he goes so far as to say 3D "was the Trojan Horse for digital projection," a reference to the Greeks' surprise attack to defeat Troy.[43] Thus, 3D's status as only one part of a broader strategy to convert theaters to digital projection became a sort of common sense in the industry and beyond. In other words, 3D seemed to be more about something else other than the actual 3D, planting the discursive seeds that the advent of 3D was not artistically motivated.

However, even more problematic for the impending debates about 3D, the Hollywood trades also focused much of its attention on the possible revenues associated with 3D. As I will elaborate below, critics such as Roger Ebert were skeptical about the industry using 3D to raise ticket prices, and to be fair, they were not completely wrong. In April 2009, a *Variety* report on ShoWest, the exhibitor gathering now known as CinemaCon, said, "Industry leaders hailed [3D] as a game-changer, because it allows circuits to charge a premium that moviegoers wouldn't

[41] Peter Debruge, "3-D exhib boom's new post puzzles," *Daily Variety*, April 13, 2007.

[42] Pamela McClintock, "Digital Deals Boost 3D," *Daily Variety*, October 27, 2009.

[43] David Bordwell, "Pandora's digital box: In the multiplex," *Observations on film art*, December 1, 2011, http://www.davidbordwell.net/blog/2011/12/01/pandoras-digital-box-in-the-multiplex/.

otherwise accept."[44] Here, the term "premium" refers to the several-dollar surcharge that would be added to each 3D ticket cost. At that same conference, 20th Century Fox co-chair Jim Gianopulos is paraphrased as saying "he believes 3-D can add $1 billion in box office revenues annually."[45] In March 2010, *Variety* quotes one studio executive as saying "Nobody ever dared increase the tickets by as much as 50% … Now, they have something to do it with: 3D. And guess what — the public is buying it."[46] The last quote in particular feeds into anxieties about stereoscopic upgrades being more about finance than art. This unnamed studio executive not only ties 3D to the money but also characterizes "the public" as being a naïve entity falling into a trap. To be sure, the studios were looking to new sources of revenue given the "dramatic downturn in the DVD market."[47] While it should be no surprise that the Hollywood studios are in the business of making money, 3D seemed positioned as a development that would not only affect the form of the films themselves but one that largely entered the conversation a financial opportunity.

Enter 3D conversion. Later in this chapter, I will address the specific histories of the main 2D-to-3D conversion companies, and as these accounts will demonstrate, these companies' stories extend far before the 2010 rush to convert. However, this was the point at which 3D conversion entered broader industry and public conversations about 3D. As noted at the top of the introduction, *Clash of the Titans* (Prime Focus cr., 2010) quickly became a sort of shorthand for the perceived sins of 3D conversion: the afterthought decision to add 3D, the short timeline to convert an entire feature, and what were seen as poor results. *Variety*'s Peter Bart characterized

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[44] Pamela McClintock, "Disney pops out at 3-D pep rally," *Variety*, April 6-12, 2009.

[45] McClintock, "Disney pops out at 3-D pep rally."

[46] Pamela McClintock, "3D: You Do the Math," *Variety*, March 29-April 4, 2010.

[47] McClintock, "3D: You Do the Math."

the debate in the industry at the time: "There's a lot at stake in all this, which is why the debates are already getting snarky. Rivals are dismissing *Clash of the Titans* as *Trash of the Titans* since Warner Bros. rushed its 'low-end' conversion in an attempt to steal theaters away from [*Alice in Wonderland*] and [*How to Train Your Dragon*]."[48] Although this quote characterizes *Clash* as a failure specifically for Warner Bros., the film's reputation would affect the critical standing of any studio choosing to convert its films into 3D.

In my introduction, I noted how Roger Ebert's criticism of *Clash of the Titans* explicitly denigrated 3D conversion as a process, and he connected conversion's failures to the extra money being charged for 3D movie tickets.[49] Ebert might have been 3D's most prominent skeptic, but he was far from alone. *Gizmodo*'s Jesus Diaz could not have been clearer about the 3D in Disney's live-action *Alice in Wonderland* (Sony Pictures Imageworks Inc. and Legend3D cr., 2010): "I like everything about the movie except the 3D. I don't *hate* it, but it's obnoxious and distracting through most of the film. It just doesn't add anything to the experience beyond the post-movie dizziness. It's the antithesis of *Avatar*."[50] Writing about Paramount's *The Last Airbender* (Stereo D cr., 2010), *Slant Magazine*'s Nick Schager expressed his hope that the film's "cash-grab 3D hopefully further quicken[s] the glasses-requiring technology's demise."[51] *IndieWire*'s Gabe Toro said, "predictably," the 3D "from a post-conversion process" in Fox's *The Chronicles of Narnia: The Voyage of the Dawn Treader* (Prime Focus cr., Gener8 uncr.,

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[48] Peter Bart, "Eye-popping (and head-scratching) options," *Variety*, March 29-April 4, 2010, 1, 2.

[49] Roger Ebert, *Clash of the Titans* review, March 31, 2010, http://www.rogerebert.com/reviews/clash-of-the-titans-2010.

[50] Jesus Diaz, "Review: Alice In Wonderland 3D Doesn't Need the 3D," *Gizmodo*, March 5, 2010, https://gizmodo.com/review-alice-in-wonderland-3d-doesnt-need-the-3d-5486765.

[51] Nick Shager, "Review: *The Last Airbender*," *Slant Magazine*, June 30, 2010, https://www.slantmagazine.com/film/the-last-airbender/.

2010) is "flat and unconvincing."[52] *The Hollywood Reporter*'s Michael Rechstshaffen says of Sony's *The Green Hornet* (Stereo D, Legend3D, Venture 3D, Sassoon Film Design, Sony Pictures Imageworks Inc. cr., 2011): "With the exception of Gondry's dynamic "Kato-Vision" fight sequences … the only other time the 3D conversion really comes to life is during the closing-credit pop art sequence."[53] Time and time again, critics emphasized the 2D-to-3D conversion did not work, 3D did not add enough to these films, and, in some case, they simply wanted 3D to go away.

The skepticism concerning 3D thus led many critics to address a specific question: Because the film was being simultaneously released in both 2D and 3D versions, which versions should the audience see? In Chapter 3, I further explore the coexistence of 2D and 3D versions for a given film, contextualizing the phenomenon in terms of media "windows" and considering its implications for our understanding of textuality and originality. But here, I am specifically interested in how the industry's financial framing for 3D, with regard to digital cinema and box office, affected the very way that critics and audiences talked about 3D. Ticket sales have long been considered a manner in which audiences could express their preferences about what they wanted and what they did not want. Writing on classical Hollywood in the 1940s, Susan Ohmer underlines how pollsters and audience researchers characterized the moviegoing public as consumer-subjects. As she shows, Gallup suggested that "Every time that John Citizen walks up to the box office and pays his quarter he casts a vote in favor of the picture being shown."[54]

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[52] Gabe Toro, "Review: 'Voyage Of The Dawn Treader' Is A Cruise Ship To Inanity," *IndieWire*, December 6, 2010, https://www.indiewire.com/2010/12/review-voyage-of-the-dawn-treader-is-a-cruise-ship-to-inanity-121453/.

[53] Michael Rechstshaffen, "'The Green Hornet' Film Review: Seth Rogen Is Pleasantly Goofy, But Movie Fails to Take Off," *The Hollywood Reporter*, January 11, 2011, https://www.hollywoodreporter.com/review/green-hornet-film-review-seth-70591.

[54] Susan Ohmer, "Measuring Desire: George Gallup and Audience Research in Hollywood," *Journal of Film and Video* 43, no. 1-2 (Spring-Summer 1991), 9.

Although Ohmer is writing about Hollywood of the 1940s, this very logic continues to this this day as a sort of common sense about cinema audience behavior. Thus, the 3D corollary to this notion holds that the viewer can vote whether a 3D version of a film is worth their money and, by extension, whether 3D in general is worth it.

In essence, a 3D critics' attack on 3D could be seen as campaigning a vote of no confidence in stereoscopic cinema. Conservative website *The Washington Free Beacon* has criticized 3D as a Hollywood scam on a number of occasions. Sonny Bunch advises that viewers not see *Godzilla* (Gener8 and Stereo D cr., 2014) in 3D because "3D is a pustulent sore on the face of cinema, one that we will not be rid of until consumers stop paying an exorbitant surcharge for the pleasure of shoving uncomfortable plastic frames onto their faces to view a film that goes out of focus if you slightly turn your head."[55] Bunch's scathing critique of the technology is tied to a hope that audiences, empowered with agency in a free market economy, will reject 3D. He continues by suggesting "lining Hollywood's pockets will only encourage them to foist this hideous format on us in greater numbers."[56] The message is simple. Buy tickets for 3D movies, and the atrocity will continue. Refuse to buy tickets for 3D movies, and it will stop.

The choice of the filmgoer is best embodied by film site Cinema Blend's column, "To 3D Or Not to 3D."[57] Featuring reviews for almost every major 3D release from 2010's *Clash of the*

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[55] Sonny Bunch, "'Godzilla' Review," *The Washington Free Beacon*, May 16, 2014, http://freebeacon.com/culture/godzilla-review/.

[56] Bunch, "'Godzilla' Review," *The Washington Free Beacon*.

[57] It should be noted that in the 1950s, *Variety* asked an almost identical question. Scholar Nick Jones criticizes such a binary between 3D and not 3D. Specifically, he proposes that the lens of media archaeology is useful for understanding digital 3D because this scholarly approach "[avoids] pejorative statements around what cinema is or should be (2D or 3D?)." "3-D or Not 3-D the Big Question; Goldwyn May Join the Parade," *Variety*, February 25, 1953; Nick Jones, *Spaces Mapped and Monstrous: Digital 3D Cinema and Visual Culture* (New York: Columbia University Press, 2020), 4-5.

Titans to the present, the column assesses whether the 3D version of a particular film is worth the extra money. In the inaugural column, Josh Tyler suggests that "the biggest question any potential moviegoer faces right now isn't so much which movie to see, but how to see it."[58] Furthermore, the writers of the column emphasize that their pieces should be seen as separate from their official, subjective reviews of the film. Tyler characterized this criteria as constituting an "unbiased, seven-point system for determining 3D is worthy of your wallet," and suggests that if "if you want an opinion on the movie," "that's not what this is about."[59] The seven categories include a fit score, a planning & effort score, a before the window score, a beyond the window score, a brightness score, a glasses off score, and an audience health score. In Chapter 3, I will discuss in further detail what these reviews suggest about the nature of the 3D conversion as a parallel text with its own unique aesthetic. Here, I want to emphasize how perceived experiential value became firmly tied to monetary value and consumer choice.

In attempting to determine the value of a 3D version in relation to its 2D counterpart, Cinema Blend's schema emphasizes the *quantity* of 3D. Three of their seven categories underline the degree of 3D in a movie: before the window score, beyond the window score, and the glasses off score. All three underline "if you're getting the proper 3D bang for your buck."[60] The before-the-window score attempts to quantify the instances of negative parallax, or the frequency of objects or persons protruding from the screen. The beyond the window score identifies precisely the opposite, the positive parallax involving figures that appear in a space beyond the screen

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[58] Josh Tyler, "To 3D Or Not To 3D: A Guide for Buying the Right Clash of the Titans Ticket," *Cinema Blend*, April 1, 2010, http://www.cinemablend.com/new/To-3D-Or-Not-To-3D-A-Guide-To-Buying-The-Right-Clash-Of-The-Titans-Ticket-17882.html.

[59] Tyler, "To 3D Or Not To 3D: A Guide for Buying the Right Clash of the Titans Ticket."

[60] Eric Eisenberg, "To 3D Or Not To 3D: Buy The Right Guardians Of The Galaxy Ticket," *Cinema Blend*, April 30, 2014, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Guardians-Galaxy-Ticket-66528.html.

plane. And finally, the glasses test estimates the level of parallax, or the distance between the two images that create a sense of depth. Their rubric implies that quantity plays a significant role in whether a 3D version of a film is right for a viewer. That is, once they have made a qualitative decision about which movie they went to see, they can then make a quantitative decision about which version to see.

Media scholars have also identified the predominant conversation about 3D versions as mere upgrades of their 2D counterparts, with some worthier than others. Chuck Tryon discusses the 3D versions of movies in relation to his argument that films have become files in the digital age. In this context, Tryon suggests there is a connection between films-as-files and the fact that audiences have to choose "not merely when to watch a movie or in what theater but also in what format and to consider whether viewing the film in 3D or in IMAX is worth the surcharge."[61] Tryon says "films have become data that can be upgraded or rebooted," conflating the processes of rebooting a film franchise and of adding 3D to a 3D version of the film.[62]

I believe that Tryon accurately characterizes how audiences perceive 3D, and the technology's role in the industry more broadly. However, I would go further a bit further, to suggest that the popular focus on 3D as an add-on subsumes 3D versions of the films to their 2D counterparts, reduces the films to their economic value, and lives little room for discussion of the creative labor required to produce the stereoscopic versions. It is important to note that much of film criticism in general is focused on consumption, the question of whether the reader should see the film or not.[63] Further, it is also true that just about all creative labor is erased in media

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[61] Chuck Tryon, *On-Demand Culture: Digital Delivery and the Future of Movies* (New Brunswick: Rutgers University Press, 2013), 7.

[62] Tryon, *On-Demand Culture*, 91.

[63] This is clearly evident in a later review schema for the television review series At the Movies. A viewer could be advised to "see it," "skip it," or "rent it."

industries, subsumed to the text. However, I see critical debates about 3D as specifically inflected by the issue of parallel 2D and 3D texts, and in this context, the popular understanding of 3D versions as "upgraded or rebooted" files exacerbates the assumption that 3D conversion is somehow automated or free from creative intervention. The work of 3D filmmakers and of 3D conversion professionals in particular can thus easily be dismissed as an afterthought by the film studio or a level-up unworthy of three more dollars. This section has not exhausted all of the issues debated concerning 3D. The popular press has also discussed the possibility of adverse physiological effects such as headaches or eyestrain.[64] Film critics have criticized what they see as 3D's "fascist" style, forcing the audience to look at specific places all of the time.[65] However, I see these points as additional arguments to persuade audiences to not watch 3D movies and to simply let them die.

The Many Deaths of Digital 3D

My evocation of death may seem extreme, but it is precisely in these terms that 3D skeptics would often report stereoscopic cinema's apparent decline. Thus, I close this section with a consideration of how mainstream film reporters and critics have frequently proclaimed the death of 3D. Life or death would be upheld as the ultimate conclusion of audiences choosing to

[64] For an example of a heath-based critique of 3D, see Daniel Engber, "The Problem With 3-D," *Slate*, April 2, 2009, http://www.slate.com/articles/health_and_science/science/2009/04/the_problem_with_3d.html. 3D historian Ray Zone specifically attempts to debunk these analyses in his own book. The question of negative health impacts is not limited to 3D film, as Lynn Spigel has addressed similar discourses regarding the supposedly harmful effects of television. Relatedly, Fabrizio Zeri (optics and optometry) and Stefano Livi (social and developmental psychology) have conducted research to better understand the specifics of possible "visual discomfort" while watching 3D cinema. Zone, *3D Revolution*, 352-356; Lynn Spigel, *Make Room for TV: Television and the Family Ideal in Postwar America* (University of Chicago Press, 1992); Fabrizio Zeri and Stefano Livi, "Visual discomfort while watching stereoscopic three-dimensional movies at the cinema," *Ophthalmic & Physiological Optics* 35 (2015): 271-282.

[65] Jim Emerson, "Avatar 3D headaches: Look at this! Don't look at this!," *Scanners*, December 20, 2009, http://www.rogerebert.com/scanners/avatar-3d-headaches-look-at-this-dont-look-at-this.

3D or not to 3D. I am not proclaiming that 3D is here to stay, as this would be as foolish as annually announcing its demise. Instead, I hope to underline the occasionally absurd terms in which critics would attempt to put an end to the story of 3D. Indeed, it is an extension of market-driven logic to suggest that simply because something is no longer dominant, it is somehow deceased.[66]

If the audience voted for or against 3D through their ticket purchases, industry journalists thus routinely analyzed box office numbers as indications of the moviegoing public's acceptance of 3D. For example, in 2014, *Variety* reported that *Godzilla* grossed $14.1 million in domestic IMAX 3D showings, the "highest revenue per-screen averages since [2013's] *Man of Steel*."[67] Analysts also commonly reported the *percentage* of the box office take that could be attributed to the 3D screenings. For instance, *Godzilla* reportedly earned 51 percent of its domestic opening box office from 3D screenings.[68] But perhaps most significantly, *Variety*'s Brett Lang framed *Godzilla* as a continuation of a pattern involving the successes of *Captain America: The Winter Soldier* (Stereo D cr., Gener8 uncr., 2014) and *The Amazing Spider-Man 2* (Legend3D cr., 2014) in 3D earlier that summer. At the same time, this uptick is with the failures of *World War Z* (Prime Focus ver., 2013) at 34 percent and *The Wolverine* (Stereo D cr., 2013) at 30 percent the summer before. While it might be tempting to dismiss such news as having little impact on popular discourse about 3D, Charles R. Acland underlines how box office results have become a normal component of pop culture news: "For movie fans, awareness of box office winners has now joined star biographies and genre identification as a fundamental component of film

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[66] For a discussion of network television's purported "death," see M.J. Clarke, *Transmedia Television: New Trends in Network Serial Production* (New York: Bloomsbury, 2013), 1-2.

[67] Brent Lang, "'Godzilla': 4 Takeaways From a Monster Opening at the Box Office," *Variety*, May 19, 2014, http://variety.com/2014/film/news/godzilla-4-box-office-takeaways-from-a-monster-opening-1201186375/.

[68] Lang, "'Godzilla,'" *Variety*.

knowledge … The publication in Monday's newspapers of the weekend's top-grossing films is likewise a corollary of the reviews clustered in the Thursday, Friday, and Saturday papers."[69] Indeed, the coverage of 3D ticket sales would certainly impact the broader conversation about 3D's place in contemporary film.

If poor showings for 3D-specific showings suggested audience disinterest, industry analysists would often jump on negative reporters as signs that 3D was on its way out.[70] If *Avatar*'s box office success got the 3D conversation going in late 2009 and early 2010, *Pirates of the Caribbean: On Stranger Tides* (native 3D + Legend3D cr.) was among the films that got people the conversation was over in 2011. 3D screenings accounted for 46 percent of the sequel's opening weekend gross in May 2011.[71] According to *The Hollywood Reporter*, this represented the first time that "majority of the audience opted to see a studio 3D pic in 2D."[72] This prompted major 3D proponents such as DreamWorks Animation's Jeffrey Katzenberg lament how it was "really heartbreaking to see what has been the single greatest opportunity that has happened to the film business in over a decade being harmed," and he attributed this loss of domestic enthusiasm to the fact that audiences had been cheated too many times by a lack of quality experiences.[73] It is unsurprising that Katzenberg would take the initiative to boost the

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[69] Charles R. Acland, *Screen Traffic: Movies, Multiplexes, and Global Culture* (Durham: Duke University Press, 2003).4.

[70] For an economic analysis of 3D's financial impact (which begins by referencing the rapid boom-and-bust narrative in the trades), see Ann-Kristin Knapp and Thorsten Hennig-Thurau, "Does 3D Make Sense for Hollywood? The Economic Implications of Adding a Third Dimension to Hedonic Media Products," *Journal of Media Economics* 28, no. 2 (2015): 100-118.

[71] Brandon Gray, "Weekend Report: 'Pirates' Rides Smaller 'Tides'," *Box Office Mojo*, May 23, 2011, http://www.boxofficemojo.com/news/?id=3169&p=.htm.

[72] Pamela McClintock, "Jeffrey Katzenberg on the 'Heartbreaking' Decline of 3D (Exclusive Q&A)," *The Hollywood Reporter*, June 9, 2011, https://www.hollywoodreporter.com/news/jeffrey-katzenberg-why-hollywood-is-196616.

[73] McClintock, "Jeffrey Katzenberg on the 'Heartbreaking' Decline of 3D."

perception of 3D. Under his leadership, DreamWorks Animation was a relatively early adopter of and advocate for 3D, having released *Monsters vs. Aliens* in the format on March 27, 2009, via Paramount. By suggesting other studios' applications, not the technology itself, were to blame, Katzenberg seems to be saving face after going all in. Perhaps most tellingly, Katzenberg used the Q&A to preemptively qualify that despite the drop in numbers for 3D films, "It's not in any fashion, shape or form the *demise* of 3D [emphasis added]."[74]

Katzenberg's reference to a possible demise, about a year and a half after the beginning of its boom, may seem a bit unnecessarily defensive. However, even earlier, 3D's biggest critics had already predicted the stereoscopic phenomenon's death. The headline of an August 2010 *Slate* article asked, "Is 3-D Dead in the Water?," and writer Daniel Engber had numbers to make the case that, although many seem worried about 3D's decline, the technology's position was worse than thought.[75] Engber explains that there is "either too much supply or not enough demand," and, consequently, "the added benefit of screening in three dimensions is trending toward zero."[76] As the article's title suggests, 3D critics were not only content to note the apparent decline in enthusiasm. They wanted to be the first to call the time of death. Indeed, time and time again, after a slump in 3D numbers, think pieces emerged to declare the trend over.

This obsession with the death of a trend is not limited to 3D. To an extent, this sort of preemptive declaration seems deeply rooted in the "Breaking News" culture of entertainment reporting that has been exacerbated by the internet. In an age where technologies come and go so fast, writers want to be ahead of the trends, and they put their forecasts in writing to ensure they

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[74] McClintock, "Jeffrey Katzenberg on the 'Heartbreaking' Decline of 3D."

[75] Daniel Engber, "Is 3-D Dead in the Water?," *Slate*, August 24, 2010, http://www.slate.com/articles/arts/culturebox/2010/08/is_3d_dead_in_the_water.html.

[76] Engber, "\Is 3-D Dead in the Water?."

receive credit for being the "first." This desire to be first becomes especially significant when it is tied to a skepticism of mass culture or corporate greed. The writer is not only the first but is also above corporate tricks and, possibly, those not so savvy to avoid these traps. Further, in a digital economy driven by clicks and enabled by seemingly infinite space, writers have little to lose by throwing out their predictions. The opportunity to be right first is a risk they are willing to take. In a broader sense, the references to death seem a logical extension of the industry's long-standing tendency to narrativize itself. John Thornton Caldwell elaborates several trade story tropes (e.g. war stories, genesis myths, and making-it sagas) in an application of narrative theory not to film and television media texts but to practitioner speak.[77] Although Caldwell primarily deals with stories directly from above- and below-the-line professionals, and I am largely considering narratives by journalists and critics, death seems a logical worst-case scenario for these sort of narratives, the appropriate end to a tragic arc.

However, just as surely as some rushed to announce the death of 3D, others rushed to resuscitate the three-dimensional cinema. A headline for a July 8, 2011, *Forbes* articles proclaims, "*Transformers: Dark Of The Moon* Brings 3D Back From The Dead."[78] Mark Hughes uses the column to poke fun at the obsession with mortality in 3D cinema coverage. Hughes jokingly announces how "[a]fter about a month of predictions that the sky had fallen for 3D films (because three or four movies *only* brought in around 40-45% 3D ticket sales, as compared to a previous 60% range for other 3D films) a miracle appears to have happened" with the opening

[77] John Thornton Caldwell, *Production Culture: Industrial Reflexivity and Critical Practice in Film and Television* (Durham: Duke University Press, 2008), 37-59.

[78] Mark Hughes, "'Transformers: Dark Of The Moon' Brings 3D Back From The Dead," *Forbes*, July 8, 2011, https://www.forbes.com/sites/markhughes/2011/07/08/transformers-dark-of-the-moon-brings-3d-back-from-the-dead/#4a1adebe4db0.

weekend success of the third *Transformers* film.[79] Specifically, Hughes argues how "the proclamations of 3D's demise were always hyperbolic wishful thinking by those who don't care for 3D."[80] This box office commentary suggests how box office reports were about more than just numbers, as they also deliver analyses of cultural value and taste.

This conversation about the death and rebirth of 3D appears time and time again. Sometimes, critics nuance their proclamations of death. Devin Faraci referred to only 39 percent of audiences seeing *Thor: The Dark World* (Stereo D cr., 2013) in 3D as "an overwhelming refutation of the 3D gimmick."[81] Faraci wants to use these numbers as proof of 3D's death, but he understands that "calling 3D dead in the wake of *Gravity* is silly."[82] That is, Alfonso Cuaron's critically and financially successful 3D "masterpiece" is proof of what 3D can be, so Faraci instead clarifies it is "beyond due to call time of death on shitty, poorly done 3D."[83] Citing both financial and aesthetic explanations, he asks about the upcoming Marvel release, "It's not too late to throw in the 3D towel on *Winter Soldier*, is it?"[84] Faraci's hopes were dashed, as *Captain America: The Winter Soldier* (Stereo D cr., Gener8 uncr., 2014) proved a 3D success. *The Wrap* declared that its 3D screenings' 40 percent share "Signals 3D Rebound."[85] Brett Lang characterizes *Captain America* sequel's numbers to be evidence that 3D film was "stabilizing,

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[79] Hughes, "'Transformers: Dark Of The Moon' Brings 3D Back From The Dead."

[80] Hughes, "'Transformers: Dark Of The Moon' Brings 3D Back From The Dead."

[81] Devin Faraci, "Marvel Needs To Quit It With The 3D," *Birth.Movies.Death.*, November 18, 2013, https://birthmoviesdeath.com/2013/11/18/marvel-needs-to-quit-it-with-the-3d.

[82] Faraci, "Marvel Needs To Quit It With The 3D."

[83] Faraci, "Marvel Needs To Quit It With The 3D."

[84] Faraci, "Marvel Needs To Quit It With The 3D."

[85] Brett Lang, "'Captain America: The Winter Soldier' Success Signals 3D Rebound," *The Wrap*, April 7, 2014, https://www.thewrap.com/captain-america-winter-soldier-sign-3d-rebound/.

not shrinking."[86] While long-term trends tended to undercut definitive proclamations, some industry analysts still preferred to see 3D film not in a state of ebb and flow but, rather, constantly at the verge of annihilation. Thus, someone would declare 3D dead, and someone else would step in to suggest reports of 3D's demise have been greatly exaggerated.

The over-analysis of 3D's box office intake represents a clear corollary to contemporary Hollywood's emphasis on the opening weekend box office number. As noted by many scholars, contemporary Hollywood's business model intensely focuses on a film's opening weekend success as an indicator how the film with fare as it moves through the various ancillary windows. Geoff King writes that contemporary big-budget blockbusters, "are under pressure to make money quickly," and thus, "the returns of opening weekend come in for intense scrutiny by studio executives."[87] Frederick Wasser has emphasized how, even as theatrical releases represent a smaller percentage of Hollywood's revenue, success in theaters is still seen as crucial to the success of films in ancillary markets.[88] Thus, in contemporary Hollywood business reporting, opening weekends tend to be analyzed on two levels: on the level of the individual film, and on the level of what the film represents more generally. For instance, the successful opening weekend for the foul-mouthed, hyperviolent *Deadpool* (2016) not only indicated audience acceptance of the actual film; it also became an indication of how studios might approach other R-rated films.[89] Analysts eyed *Wonder Woman*'s (Gener8 cr., 2017) opening numbers not only to

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[86] Lang, "'Captain America: The Winter Soldier' Success Signals 3D Rebound."

[87] Geoff King, *New Hollywood Cinema: An Introduction* (London: I.B. Tauris, 2007), 57.

[88] Frederick Wasser, *Veni, Vidi, Video: The Hollywood Empire and the VCR* (Austin: University of Texas Press, 2001), 165-171.

[89] Helen O'Hara, "Does Deadpool's huge opening weekend mean R-rated blockbusters are back?," *Digital Spy*, February 16, 2017, http://www.digitalspy.com/movies/x-men/feature/a783612/does-deadpools-huge-opening-weekend-signal-the-return-of-the-r-rated-blockbuster/.

extrapolate about the future of Warner Bros.'s DC comics franchise but also blockbusters toplined and directed by women.[90] Granted, why a film does so well upon release is itself a cultural text open to the interpretations of the reader at hand. What is most important here is how various parties interpret opening weekend numbers to have predictive significance beyond the number of tickets sold. Given the logic of Hollywood, it is little surprise that 3D percentages of opening numbers were repeatedly extrapolated as harbingers of stereoscopic cinema's future death or rebirth.[91]

In August 2017, it seemed that death had come for 3D yet again. Large-format company IMAX announced that they would cut back on 3D screenings for 2D on their proprietary screens.[92] According to *The Hollywood Reporter*, IMAX "would be reducing its 3D slate in the domestic market, citing a 'clear preference' for 2D from audiences."[93] IMAX Entertainment CEO Greg Foster said, "3D is no longer the default," that with about 35 movies released in the large-screen format, now only about 5-10 would be 3D releases.[94] Indeed, to see a movie in IMAX for years was to see a film in 3D. Simply put, all IMAX screenings were 3D screenings, with only occasional features such as Ron Howard's *In the Heart of the Sea* (Prime Focus ver.,

[90] Frank Palotta, "How 'Wonder Woman' could change Hollywood," *CNN*, June 2, 2017, https://money.cnn.com/2017/06/02/media/wonder-woman-box-office-female-director/index.html.

[91] The long-standing tradition of Hollywood using box office numbers to infer what audiences want in terms of style, stories, and stars seems a precedent for how Netflix had reportedly interpreted its user data to predict *House of Cards* as a critical and commercial success. David Carr, "Giving Viewers What They Want," *The New York Times*, February 24, 2013, https://www.nytimes.com/2013/02/25/business/media/for-house-of-cards-using-big-data-to-guarantee-its-popularity.html.

[92] For an examination of IMAX alongside other immersive cultural forms such as medieval cathedrals and science museums, see Alison Griffiths, *Shivers Down Your Spine: Cinema, Museums, and the Immersive View* (New York: Columbia University Press, 2008),

[93] Carolyn Giardina and Pamela McClintock, "Is the Golden Age of 3D Officially Over?," *The Hollywood Reporter*, August 3, 2017, http://www.hollywoodreporter.com/behind-screen/is-golden-age-3d-officially-1025843.

[94] Giardina and McClintock, "Is the Golden Age of 3D Officially Over?"

2015) and DC Comics's *Suicide Squad* (Gener8 cr., 2016) offering alternate IMAX 2D screenings. This coupling of IMAX and 3D led critics such as *The Washington Free Beacon*'s Sonny Bunch to note that, in D.C., "one cannot see the film in 3D-less IMAX," and "if you're forced to choose between seeing it in IMAX 3D and seeing it on a regular-sized, non-3D screen, I suggest you choose in the regular-sized, non-3D option."[95] *THR* headlined its 2017 story on IMAX's new strategy of less 3D screenings, "Is the Golden Age of 3D Officially Over?" A few months later, the Motion Picture Association of America released a report indicating a 18% drop in 3D ticket sales from 2016 to 2017, the worst since 2009, the year that saw the release of *Avatar*. *The Playlist* headline on the MPAA report asked, "Is The 3D Film Fad Finally Coming To An End?"[96] Similarly, *SlashFilm*'s headline asked, "Is the 3D Movie Trend Finally Dying?" Writer Hoai-Tran Bui explicitly goes so far as to say, "I would be overjoyed on the day that 3D finally bites the dust."[97]

While the 2017-2018 batch of death proclamations seemed, as they had been before, mostly about cultural posturing, this particular time period did, in fact, represent a turning point in the short history of digital 3D thus far. IMAX followed through on its plan to cut 3D screenings in North America, projecting major blockbusters including *Justice League* (Gener8 cr., 2017), *A Wrinkle in Time* (Legend3D and Gener8 cr., 2018), *Tomb Raider* (Southbay cr., 2018), and *Rampage* (Stereo D cr., 2018) only in 2D. Before, when all IMAX screenings were only in 3D, 3D moviegoers would have the choice of whether they wanted to see a stereoscopic

[95] Sonny Bunch, "'Godzilla' Review," *The Washington Free Beacon*, May 16, 2014, http://freebeacon.com/culture/godzilla-review/.

[96] Charles Barfield, "Is The 3D Film Fad Finally Coming To An End?," *The Playlist*, April 5, 2018, https://theplaylist.net/3d-film-ticket-sales-20180405/.

[97] Hoai-Tran Bui, "Is the 3D Movie Trend Finally Dying?," *SlashFilm*, April 5, 2018, https://www.slashfilm.com/3d-movie-box-office/.

version through standard digital projection or through IMAX's proprietary premium technology. Now, for IMAX 2D-only films, audiences would now choose between flat, large-format IMAX or non-IMAX 3D. In essence, this creates for many films a conflict between regular 3D and IMAX 2D as two distinct viewing options, ones with very different levels of cultural capital.

While 3D has been framed as a bad object, IMAX film has a reputation of excellence, one linked to its historical associations with film. From 2009 to 2017, when IMAX still coupled IMAX with 3D, whenever available, IMAX also distributed films with no 3D option whatsoever. The most high-profile example of these exceptions were the films of Christopher Nolan, a director acclaimed for his early independent films [e.g. *Memento* (2000)] and still respected for creative risks and technological breakthroughs in high-budget studio films. In an interview with the Directors Guild of America, Christopher Nolan referred to IMAX's proprietary 70mm film as "the gold standard and what any other technology has to match up to, but none have."[98] By talking about film technology with such apparent expertise, Nolan positions himself as an artist who knows the technologies of his mediums, putting him in the tradition of auteurs such as Stanley Kubrick.[99] In Chapter 3, I will explore how many film critics and artists have latched onto the chemical base of analog systems and the resultant "indexicality" as central to film's appeal, and how this attachment has affected the cultural perception of digital developments such as computer-generated visual effects and post-production 3D conversion. Fittingly, Nolan's embrace of IMAX film is matched by the director's disinterest in 3D: "3-D is a misnomer. Films

[98] Jeffrey Ressner, "The Traditionalist," *DGA Quarterly*, Spring 2012, http://www.dga.org/Craft/DGAQ/All-Articles/1202-Spring-2012/DGA-Interview-Christopher-Nolan.aspx

[99] The Nolan and Kubrick connection became especially explicit when Nolan became involved in an "unrestored" version of *2001: A Space Odyssey* (1968), a new version that "the occasional visible scratch would be allowed to slip through," with the *New York Times* likening it to a "classic record on vinyl, with pops and all." Sopan Deb, "Christopher Nolan's Version of Vinyl: Unrestoring '2001'," *New York Times*, May 11, 2018, https://www.nytimes.com/2018/05/11/movies/2001-a-space-odyssey-christopher-nolan-cannes.html.

are 3-D. The whole point of photography is that it's three-dimensional. The thing with stereoscopic imaging is it gives each audience member an individual perspective. It's well suited to video games and other immersive technologies, but if you're looking for an audience experience, stereoscopic is hard to embrace."[100] Nolan's reference to film as inherently three-dimensional evokes a much longer tradition of trade pedagogy, in which aspiring directors and cinematographers have learned how to stage in depth and have studied principles of perspective dating back to Renaissance painters.[101] By specifically criticizing stereoscopic cinema at this moment in the industry's history, Nolan suggests that digital 3D contradicts what he understands as the art of cinema.

Given the disparate levels of aesthetic credibility between IMAX and 3D, the tying together of the two technologies from 2009 to 2017 made for a contradiction in cultural legitimacy. Granted, many of the films shot with 70mm IMAX cameras did not have a 3D option: *Mission: Impossible – Ghost Protocol* (2011), *The Hunger Games: Catching Fire* (2013), and Nolan's own *The Dark Knight* (2008), *The Dark Knight Rises* (2012), and *Interstellar* (2014). Theaters that would properly equipped could then show the applicable sequences in a taller aspect ratio, 1.44:1 at its tallest. However, a number of films were shot on 70mm cameras but then converted into 3D in post-production, resulting in a combination of what Nolan would see as IMAX's scale and 3D's "intimacy." *IFC.com* noted this when it reported *Star Trek Into Darkness* (Stereo D cr., 2013) to be the "first movie shot in IMAX that's presented in 3D" (fig. 2).[102] Writer Terri Schwartz emphasizes that "while the movie was filmed with IMAX cameras,

[100] Ressner, "The Traditionalist."

[101] For a recent example of a cinematographers' guide explaining these principles, see Blain Brown, *Cinematography: Theory and Practice*, third edition (London, Routledge: 2016), 17-20.

[102] Terri Schwartz, "'Star Trek Into Darkness' to be First Movie Shot in IMAX That's Presented in 3D," *IFC.com*, November 20, 2012, https://www.ifc.com/2012/11/star-trek-into-darkness-imax-3d.

Figure 2: Video by YouTube user Average Logic offers a side-by-side comparison of the regular theatrical and IMAX Blu-ray presentations for *Star Trek Into Darkness*. The image on the right has an aspect ratio of 1.78:1 (or 16:9) to fit HD televisions, rather than the 1.44:1 projected on full IMAX screens or the 1.90:1 projected in digital IMAX. Nonetheless, the comparison still underlines how unique IMAX aspect ratios yield multiple versions of sequences in need of 3D conversion. Source: Average Logic, "Star Trek: Into Darkness: Theatrical vs. IMAX Blu-ray Comparison," YouTube video, 3:27, September 12, 2019, https://www.youtube.com/watch?v=GIy4oVXkoVU.

it wasn't also shot in 3D," as if the two cancelled each other out.[103] The specific combination of IMAX film cameras and digital 2D-to-3D conversion only occurred a couple of other times: *Star Wars: The Force Awakens* (StereeD, 2013), for which the full-frame IMAX image only played in select theaters, and *Batman v Superman: Dawn of Justice* (Gener8 cr., 2016), which was one of the early films to have both IMAX screenings in both 2D and 3D.[104] Thus, although these

[103] Schartz, "'Star Trek Into Darkness' to be First Movie Shot in IMAX That's Presented in 3D."

[104] The varying aspect ratios for IMAX releases can specifically affect the 2D-to-3D conversion process, necessitating some extra steps. For example, IMAX releases of *Batman v Superman* featured sequences shot and projected in IMAX's 1.44:1 (or 1.90:1 in IMAX Digital), but much of the film was still 2.35:1, necessitating switches in aspect ratio throughout the film. Thus, when converting such a film, companies such as DNEG must account for at least two different 3D versions: one for IMAX with multiple aspect ratios, and one for regular 3D exhibition that remains 2.35:1 throughout. For non-IMAX exhibition in both 2D and 3D, the images shot for large format need to be cropped down to accommodate standard projection. DNEG's Ben Breckendrige described to me this unique process: "For the 2K version of the film, they will use the IMAX shot just cropped and formatted for that 2K version of the film. We'll always work on the larger one. Because the primary format of the film will be the 2K

instances were rare, they highlighted the tension between IMAX's unique projection and digital 3D conversion that came to the surface when IMAX distanced itself from 3D screenings in the U.S.

The separation of IMAX and 3D in the North American market becomes especially pronounced when actors or filmmakers actively promote the IMAX 2D version of the film. In a promotional video posted through the IMAX YouTube channel, Tom Cruise advocates that audiences should see *Mission: Impossible – Fallout* (Prime Focus cr., 2018), the sixth movie in the series, in IMAX.[105] Because the film was released only in 2D in the U.S., Tom Cruise, credited as a producer on the film, is implicitly telling audiences to not see his film in 3D. Cruise explains, "I've had a long history with IMAX, so it's made for IMAX." He continues, "You look at a film like *Mission: Impossible* on IMAX, the scale of the movie is enormous. When you're seeing it on that size of screen with that perfect sound, it is just a different experience." Notably, this *Mission: Impossible* had specific scenes in which the frame would open up from an aspect ratio of 2.35:1 to 1.90:1, meaning that audiences would see literally more of the film in IMAX (fig. 3). In this instance, the audience could only see "more" if they choose to not see the film in 3D. Although Cruise is not the director of the film, he is an actor known to exact a unique amount of control over his projects, in some cases setting up for the blame after a particular project's financial and/or critical failure.[106] To be sure, the nature of this promotional video must

version, we set our depth and plan for that, and then we do QC passes in IMAX." While usually the conversion work they have done will work fine for both 2K and IMAX formats, they will sometimes need to adjust depth cues, as they prove more difficult on the eyes in a larger format, or make other minor adjustments, as specific compositing challenges might only be visible in large format. Ben Breckenridge, in phone interview by the author, May 21, 2019.

[105] IMAX, "IMAX® Presents | Tom Cruise & Mission: Impossible – Fallout," YouTube video, 1:30, July 18, 2018, https://www.youtube.com/watch?v=XfKMvpWkhQc.

[106] Ramin Setoodeh and Brent Lang, "Inside 'The Mummy's' Troubles: Tom Cruise Had Excessive Control," *Variety*, June 14, 2017, https://variety.com/2017/film/news/the-mummy-meltdown-tom-cruise-1202465742/.

be taken into consideration, as it is designed by IMAX to promote IMAX. Further, in markets outside of North America, Cruise would be interpreted as implicitly promoting the 3D version of the film, where IMAX and 3D are still routinely tied together. Still, Cruise's active promotion of the IMAX version of his latest film suggests how, in a sense, IMAX has left 3D to fend for itself in the North American market.

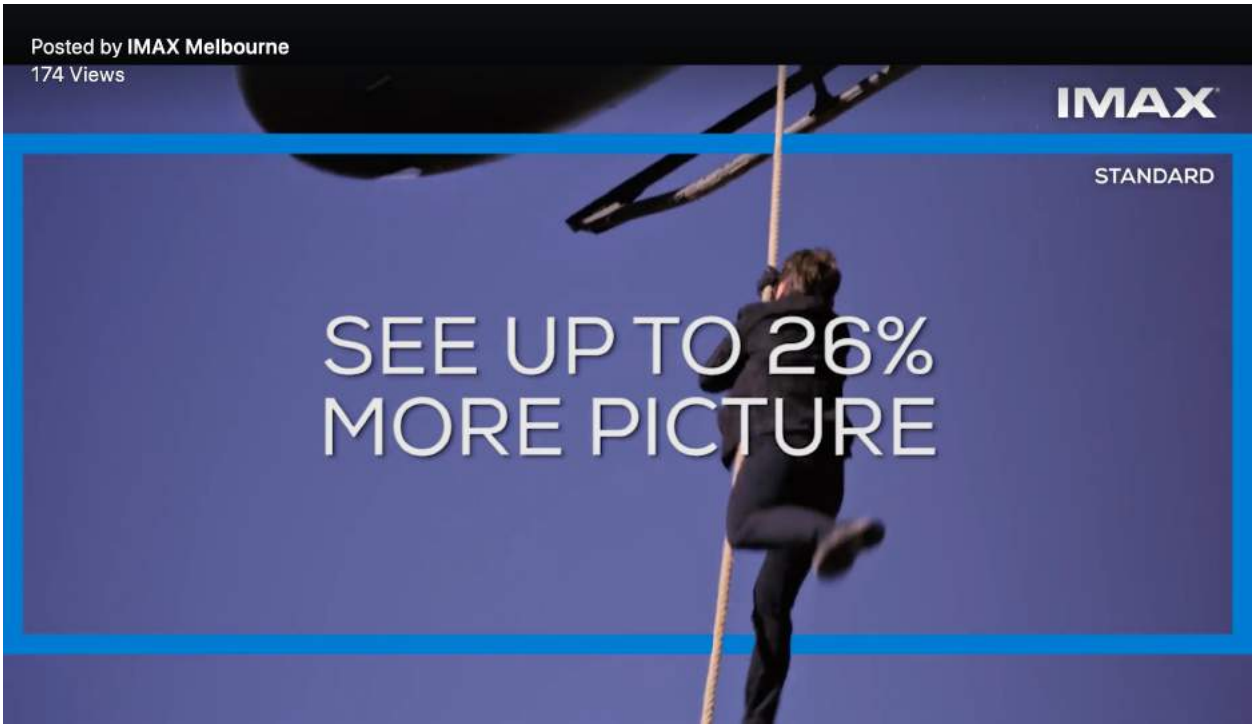

Figure 3: An IMAX Melbourne promotional video demonstrates how the Canadian-based premium format allows audiences to "See Up to 26% More Picture" for select sequences of *Mission: Impossible – Fallout*. Source: IMAX Melbourne, Facebook video, 0:37, August 1, 2018, https://www.facebook.com/imaxmelbourne/videos/experience-mission-impossible-fallout-to-the-fullest-in-imax-now-showing-on-the-/10156538110814911/.

Before moving on, I want to briefly acknowledge that debates concerning 2D-to-3D conversion's bad-object status do not exist in pure isolation. Hollywood's propensity for franchises with numerous sequels, remakes, and reboots is in and of itself a subject of critical heat, and of the major studios' 70 live-action 3D conversion releases from 2010 to 2015, 38 were

part of film series with more than one entry.[107] Both franchise filmmaking and 3D conversion elicit similar concerns about forsaking the virtue of originality to maximize profits, whether that be adding 3D where it "doesn't belong," or choosing to greenlight yet another sequel rather an original story.[108] Relatedly, Julian Stringer has noted casual dismissals of blockbusters films as "lowest common denominator filmmaking."[109] Many 3D blockbusters fall specifically into the category of superhero comic films, a frequent target of cinematic tastemakers.[110] And as I will discuss at length with Tony Scott and Legend3D's conversion of *Top Gun* (1986), particular directors who direct blockbuster films are seen as especially distasteful in the eyes of popular film critics. In short, 3D conversion typically represents only one undesirable element of films that have plenty of reasons to be critically disregarded. There is not enough room to fully explore all of these issues and how they intersect with 3D, but I reference these other issues throughout

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[107] This number does not include films with, as of January 2020, upcoming sequels, such as *World War Z* (2013). This also does not include remakes that have not yielded their own sequels, such as *Poltergeist* (2015) or *Point Break* (2015). Finally, this does not include classic 2D titles converted into 3D, the primary subject of Chapter 2. For an example of the intersection between anti-sequel and anti-3D disdain, consider *Variety*'s 2014 list of the "Most Unnecessary Sequels of All Time," inspired by the then-current release of *Transformers: Age of Extinction* (native 3D + Legend3D and Prime Focus cr., 2014), the fourth in its series. In particular, in notes the way how the *Transformers* "cash cow keeps getting milked, long after original franchise stars Shia LaBeouf and Megan Fox left the series." The *Transformers* series is no critical darling, and yet even here, the writer emphasizes the loss of the "original" stars as an indication of the series being past its (Optimus) prime. "The Most Unnecessary Sequels of All Time," *Variety*, accessed July 18, 2018, https://variety.com/gallery/the-most-unnecessary-sequels-of-all-time/.

[108] Kristin Thompson addresses the "familiar complaint" about excessive sequels, how "commentators, professional and amateur alike, accuse Hollywood of having lost its imagination." She notes that while the concept of the sequel is far from new, with examples at least as far back as 1912, "in the last few decades … sequels and series have become more common and gained a higher profile." Kristin Thompson, *The Frodo Franchise:* The Lord of the Rings *and Modern Hollywood* (Berkeley: University of California Press, 2007), 2-3.

[109] In their history of Hollywood blockbusters, Steve Neale and Sheldon Hall take an expansive view that extends back to early cinema. Julian Stringer, ed., *Movie Blockbusters* (London: Routledge, 2003), 1; Sheldon Hall and Steve Neale, *Epics, Spectacles, and Blockbusters: A Hollywood History* (Detroit: Wayne State University Press, 2010).

[110] For example, in his review for *The Avengers* (2012), A.O. Scott sardonically refers to films "featuring troubled guys wearing costumes and fighting evil," and despite identifying aspects of the film he admired there is ultimately "the grinding, hectic emptiness, the bloated cynicism that is less a shortcoming of this particular film than a feature of the genre." A.O. Scott, "Superheroes, Super Battles, Super Egos," *New York Times*, May 2, 2012, https://www.nytimes.com/2012/05/04/movies/robert-downey-jr-in-the-avengers-directed-by-joss-whedon.html.

in recognition that 3D does not exist in a vacuum separate from these other parallel debates. Still ultimately, this study largely focuses on the issues most proximate to 3D conversion, because these prove most significant for the specific companies converting films into 3D. It is the history of these companies that I will sketch out in the next section.

The Big Three (or Four) of 2D-to-3D Conversion

The first three sections of this chapter focused on the dominant historical and cultural narrative about 2D-to-3D conversion. However, the rest of this chapter is dedicated to the counter narrative of 2D-to-3D conversion companies. Indeed, while various stakeholders debated the place and status of conversion, the actual companies themselves and the individuals working for them received scant attention in the popular press. However, while conversion might be understood as a sort of monolithic entity, each of the companies involved has their own unique histories and approaches, and they exist in direct competition with each other in the bid to attract the Hollywood studios as clients.

For the majority of 2D-to-3D conversion's brief Hollywood history, three to four companies have dominated the landscape. These four companies were Gener8, Legend3D, Prime Focus, and Stereo D. Ultimately, Gener8 and Prime Focus would combine under the banner of DNEG, resulting in only three major companies in 3D conversion. Many individuals still working in stereoscopic cinema have been involved since the beginning. As Jared Sandrew, formerly of Legend3D, put it in 2019: "People that've been involved in stereo for the last 10 years have unique experience just in general because it was the Wild West … Nobody knew what they were doing 10 years ago."[111] Relatedly, Rob Hummel was CEO of post for Prime

[111] Jared Sandrew, in interview by the author, Burbank, California, May 16, 2019.

Focus in North America from 2009 to 2010, overseeing digital intermediates and post processing, when his company realized 3D was going to be big and needed him as a representative on the stereoscopic front.[112] In my interviews and in the publicly available materials that do exist, 2D-to-3D conversion professionals describe a very specific community of creative artists and technicians conceptualizing, developing, and refining 3D conversion as they go along. This next section briefly touches on how stereo conversion works, why filmmakers might choose to convert to 3D, and the early history of the major conversion companies.[113]

In the extensive 2012 overview entitled "Art of Stereo Conversion," *fx guide* explains the basic steps necessary for 3D conversions.[114] At its most basic, 3D conversion necessitates the creation of a second eye's worth of image.[115] (By contrast, in native 3D, this second eye is generated by a second camera.) To this end, 3D conversion must isolate the different elements within the frame and assign different depth values to each of these elements. In essence, they must determine what they want to appear "in front" of the screen (negative parallax), what they want "behind" the screen (positive parallax), and where they want the plane of the physical

[112] Rob Hummel, in phone interview by the author, May 6, 2019.

[113] For a practical discussion of 2D-to-3D conversion, or what the author also refers to as "synthetic 3D," see Bernard Mendiburu, *3D Movie Making: Stereoscopic Digital Cinema from Script to Screen* (Amsterdam: Elsevier, 2009), 143-147.

[114] Mike Seymour, "Art of Stereo Conversion: 2D to 3D – 2012," *fx guide*, May 8, 2012, http://www.fxguide.com/featured/art-of-stereo-conversion-2d-to-3d-2012/.

[115] To be more specific, many 3D conversion processes do not simply create a second eye of visual information but actually create two new eyes for the stereoscopic effect. Although some processes produce only one additional eye's worth of information, I refer here to a "second eye's worth of image" in a colloquial, symbolic sense. As co-founder Barry Sandrew explains, Legend3D created "two brand new frames, a left and a right frame," as he believes deriving a second eye from the first results in everything skewed to one side. By producing the two stereo pairs through conversion, Sandrew ensures "every single pixel in those two new frames is identical, precisely identical in every parameter other than the disparity that I creatively put in there." Barry Sandrew, in interview by the author, Los Angeles, California, March 18, 2019.

theater screen to be in the space of the film.[116] Of course, this process brings a number of unique challenges. Isolating the various figures means using incredibly detailed processes such rotoscoping, tracing the outlines of essentially everything in every frame of a shot. *fx guide*'s Mike Seymour also details the "parallax effect": Because a second eye will offer new visual information about what is behind characters and objects, the 3D companies need to fill in these gaps.[117] I will delve into the different techniques used by the different companies in Chapter 3, but already, a brief explanation of 2D-to-3D conversion underlines just how much work is required to achieve a stereoscopic effect that was largely dismissed as a mere "afterthought."

Filmmakers might choose to convert for a number of practical and aesthetic reasons. Seymour explains, "many filmmakers do not want the physical size of an on set stereo rig."[118] The large size of professional 3D cameras can limit mobility during filming and would necessitate a spatial rethinking of the camera's role on a set. Further, certain filmmakers might have an aesthetic preference for traditional celluloid rather than digital image capture. I will further explore such rationalizations toward the end of this chapter, so I briefly introduce these ideas here simply to underline possible reasons for converting to 3D, despite the negative stigma attached to such methods.

Although this dissertation focuses on companies such as Prime Focus and Legend3D for their 2D-to-3D conversion work, these two companies started before the push for 3D conversion starting in 2010 in areas outside of 3D. In 1997, Namit Malhotra founded Prime Focus Ltd. in a Mumbai garage, and the company's first major achievement was what they refer to as "India's

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[116] For a more detailed explanation and visualization of this process, see Ian Failes, "*The Lion King 3D*: in-depth with Disney," *fx guide*, September 22, 2011, https://www.fxguide.com/featured/the-lion-king-3d-in-depth-with-disney/.

[117] Seymour, "Art of Stereo Conversion: 2D to 3D – 2012."

[118] Seymour, "Art of Stereo Conversion: 2D to 3D – 2012."

first high-end finishing system" for film, indicative of the company's work in post-production services more broadly.[119] It was not until 2009 that Prime Focus would launch View-D, its proprietary 3D conversion process.[120] A contemporaneous press release touted that the new technology could "efficiently create stereoscopic 3D movies from source material shot on virtually any medium."[121] The news release also emphasized how the company's visual effects experience made it uniquely qualified to introduce such technology. CEO Michael Fink is quoted, "Prime Focus is a visual effects facility, so we've been calculating 3D space from 2D images for years."[122]

Similarly, Dr. Barry Sandrew originally founded the company now known as Legend3D in 2001, but the company started out by providing various digital and visual effects services other than 3D conversion.[123] Originally named Legend Films and based in San Diego, the company would only change its name around 2010 to reflect its increasing focus on 2D-to-3D conversion.[124] Most notably, Legend had previously focused on the restoration and colorization

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[119] "Major Milestones," *Prime Focus*, accessed March 22, 2018, http://www.primefocus.com/sites/default/files/pdf/Major%20Milestone.pdf.

[120] razpr, "Prime Focus Launches View-D™," *Renderosity*, October 12, 2009, https://www.renderosity.com/prime-focus-launches-view-d-cms-14759.

[121] razpr, "Prime Focus Launches View-D™."

[122] Michael Fink is currently a Professor of Cinematic Arts at the University of Southern California. Such an appointment evokes Sherry Ortner's assertion that academic study of production spaces represents a form of "studying sideways". razpr, "Prime Focus Launches View-D™"; Vicki Mayer, Miranda J. Banks, and John Thornton Caldwell, eds., *Production Studies: Cultural Studies of Media Industries* (New York: Routledge, 2009), 175-189.

[123] Rachel Abrams, "Legend3D comes to Hollywood," *Variety*, September 21, 2010, http://variety.com/2010/digital/features/legend3d-comes-to-hollywood-1118024419/; Lucas Shaw, "3D Specialist Legend3D Raises $8M in New Stock Offering," *The Wrap*, February 4, 2013, https://www.thewrap.com/3d-company-legend3d-raises-8m-new-stock-offering-76116/.

[124] Abrams, "Legend3D comes to Hollywood."

of classic movies.[125] Founder Sandrew's work on the colorization of black-and-white movies extends even further back. He researched colorization as a neuroscientist at Harvard University, and starting in 1986, he worked for American Film Technologies, the very company that Ted Turner would employ to notoriously colorize his library of classic films.[126] Sandrew has suggested his transition from colorization to 3D conversion was natural precisely because "at least 65 percent of the process of converting 2-D to 3-D is the same as converting black-and-white to color."[127] In part because Legend's 3D conversion process emerged from colorization, the company is considered to have a unique approach to stereo conversion. According to *fx guide*, Legend3D's solution is "neither geometry nor roto-reliant, but rather image processing-based."[128] (Chapter 2 will further explore the parallel discourses of colorization, 3D conversion, and other reformatting practices.) Further, *fx guide* characterizes the company's tech as more automated, "making their work high-quality, competitively priced and quick."[129]

Jared Sandrew, a former supervisor at Legend3D and son of founder Barry Sandrew, attributes the company's unique process to the professional backgrounds of those who built it. As Jared describes it, the people initially working at Legend3D were more engineers than visual effects workers. From his perspective as a compositing and visual effects artist, Jared first came to the company and thought, "the way you guys are doing it is stupid … Over the course of being there, I was like, this is actually really smart." Fittingly, Jared Sandrew started out at Legend3D

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[125] Paul Boutin, "Legend 3D's work on display in Alice in Wonderland," *VentureBeat*, March 5, 2010, https://venturebeat.com/2010/03/05/legend-3ds-work-on-display-in-alice-in-wonderland/.

[126] Mike Freeman, "Legend3D converts scenes for current Hollywood blockbusters," *San Diego Union Tribune*, February 6, 2011, http://www.sandiegouniontribune.com/sdut-ready-for-star-turn-2011feb06-htmlstory.html.

[127] Freeman, "Legend3D converts scenes for current Hollywood blockbusters."

[128] Seymour, "Art of Stereo Conversion: 2D to 3D – 2012."

[129] Seymour, "Art of Stereo Conversion: 2D to 3D – 2012."

specifically to address compositing and visual effects issues. Sandrew recalls that his father told him, "we're getting first pass approvals for depth, but we don't know what they mean when they say clean it up." In other words, Legend3D had effectively developed a process to isolate objects in the frame and add depth, but they did not have much knowledge or experience related to compositing clean-up. Jared filled this need by hiring visual effects artists in Los Angeles and teaching them to paint in stereo. Looking back, he believes Legend3D's process developed out of a combination of different perspectives and skill sets. He and his father "kind of completed each other in terms of he was handling the depth side of things, and I was handling the clean-up side of things."[130]

Legend3D's approach to conversion also made it relatively easy to recruit employees. Barry Sandrew says that he designed his processes for both colorization and for 3D conversion so that "I could train anybody off the street to do it." Given the company's original Carlsbad location, this often meant hiring graduates from the Art Institute in San Diego.[131] Possible employees would take an entry exam to determine whether they had the basic abilities to do the work, and if they passed, they would go through two weeks of training. "Then they'd be working on first-run feature films from Hollywood," Sandrew explains. Legend3D's original process made it relatively easy for individuals without visual effects experience to work on 3D conversion. In some ways, this characterization echoes the mythology of classic Hollywood, the idea that studios regularly plucked stars from everyday folk on the streets. As Sandrew puts it, "I

[130] Jared Sandrew, in interview by the author, May 16, 2019.

[131] Allen J. Scott writes about a similar relationship between the industry and educational institutions in his geographical study of Hollywood: "Many different organizations and agencies throughout Southern California provide educational and job-training opportunities for workers (and would-be workers) in the motion picture industry. The region is home to numerous colleges and universities, which in their turn are an important element of the agglomeration economies of Hollywood." Allen J. Scott, *On Hollywood: The Place, The Industry* (Princeton: Princeton University Press, 2005), 131.

took people who were not artists and created technology that allowed them to be creative, and they loved it."[132] Thus, the process combines simplicity and creativity. Its simplicity makes it cost-effective, but the allowed creativity gives it the artistic legitimacy so central to the discourses of other Hollywood crafts.

In 2014, Barry Sandrew left the company he had founded. A press release at the time explains that he left "to focus on entrepreneurial endeavors." Sandrew is quoted: "I am an entrepreneur who is most happy starting new businesses and creating disruptive technology."[133] Indeed, Sandrew would go on to support and innovate new media such as Alternate Reality (AR). However, after his departure, Legend3D took a different technological and creative approach to 3D conversion. Much of this had to do with the change in management. As Sandrew sees it, "after I left, they brought in some people who didn't quite understand [my] philosophy and got rid of that technology. They had to hire very expensive Nuke artists going forward. They increased their costs significantly."[134] (Jared Sandrew independently described Legend3D's current process as different from the one he used: "They don't do it that way anymore."[135]) Barry Sandrew elaborated, "I was not very active, or I was not friendly with the people at Legend afterward … I have no animosity toward them. I just think it's a shame that they aren't doing better."[136] I reached out to the current team at Legend3D for this project, but we were not able to

[132] Barry Sandrew, in interview by the author, March 18, 2019.

[133] Sandrew's interest in "disruptive technology" provides a fascinating contrast to David Bordwell et. al referring to technological developments such as widescreen as "trended changes," with the fundamental principles of classical Hollywood remained unchanged. Further research can tease out how to negotiate these two seemingly opposed extremes. "3D Film Pioneer Barry Sandrew Takes On New Ventures," press release, September 17, 2014, https://www.prnewswire.com/news-releases/3d-film-pioneer-barry-sandrew-takes-on-new-ventures-275427611.html; Bordwell, Staiger, and Thompson. *The Classical Hollywood Cinema*.

[134] Barry Sandrew, in interview by the author, March 18, 2019.

[135] Jared Sandrew, in interview by the author, May 16, 2019.

[136] Barry Sandrew, in interview by the author, March 18, 2019.

arrange interviews.

Although Prime Focus and Legend started before the push for 3D conversion around 2010, some companies specifically after this phase began. Rory Armes, formerly an executive at video game company Electronic Arts, founded the Canada-based company Gener8 in 2011.[137] Still, in its official press materials, the company stresses that it is expertise in relevant preexisting industries that allowed them to develop expertise in this emerging sector so quickly. Founder and CEO Armes "amassed an executive team with extensive experience in the fast-paced gaming and animation industries. The team leveraged the unique experience they gained developing immersive gaming experience in real-time 3D to develop the film industry's most flexible 3D conversion solution."[138] Paul Becker, senior vice president of production of Gener8 in early 2019, recounts how he and Armes built the company with Tim Bennison, Ben Breckenridge, and the late Neall Verheyde. The team originally sought to develop a conversion process with preexisting assets, including from Becker's previous VR and 3D venture and from Conversion Works, where Breckenridge had previously worked, but they ultimately built new software from scratch to convert 2D into 3D.[139]

Gener8 would ultimately be absorbed by Prime Focus to become part of what is now known as DNEG, a name derived from that of a third company involved in the merger, Double Negative. The merger process began in earnest when, in 2015, Prime Focus announced that it would exclusively license Gener8's 2D-to-3D conversion technology.[140] Becker describes the

[137] Media Kit, Gener8, accessed February 17, 2017, https://www.gener8.com/media/kit/backgrounder.

[138] Media Kit, Gener8, accessed February 17, 2017, https://www.gener8.com/media/kit/backgrounder.

[139] Paul Becker, in phone interview by the author, March 1, 2019.

[140] "Prime Focus and Gener8 sign Technology Licensing Partnership," press release, January 28, 2015, http://www.primefocusindia.com/media-events/prime-focus-and-gener8-sign-technology-licensing-partnership.

transaction as a "two-year deal" in which Gener8 first licensed the technology to its competitor Prime Focus and then sold the technology. He emphasizes how this deal effectively combined Gener8's unique proprietary technology and Prime Focus's massive global operations. As Becker recalls, while Gener8 could only convert one or two movies at a time, Prime Focus had the workforce to handle four or five. He adds that with the acquisition of Gener8, the company's situation "changed from, I didn't know what kind of work we would be doing in three months to, the last three years, I've actually known what we're doing two years ahead of time."[141] In Chapter 3, I will further discuss how the Gener8-DNEG approach to 3D conversion differed from other industry methods, which Becker sees as crucial to why Prime Focus wanted to acquire the much smaller company.

If Gener8 started off as the smallest of the major conversion companies, Stereo D has consistently been one of the biggest players in the market since its founding in 2009. Jared Sandrew, reflecting back on what he saw as Legend3D's underdog status, mentioned the in-house research that showed how Stereo D accounted for the largest share of the stereo conversion market.[142] Notably, Stereo D was founded by William Sherak, the son of the late Tom Sherak, the president of the Academy of Motion Pictures Arts and Sciences from 2009 to 2012. Additionally, outspoken conversion-skeptic James Cameron chose the company for conversions of two of his most popular films, *Titanic* (Stereo D and Venture 3D ver., 2012) and *Terminator 2* (cr., 2017). Thus, Stereo D has maintained relationships with major Hollywood players throughout its history. In 2011, Stereo D announced its acquisition by Deluxe Entertainment Services Group, a company involved in a variety of production, post-production,

[141] Becker, in phone interview by the author, March 1, 2019.

[142] Jared Sandrew, in interview by the author, May 16, 2019.

and distribution services.[143] Stereo D's continued strength in this industry sector might be best exemplified by the company's work on two of the biggest franchises, *Star Wars* and the Marvel Cinematic Universe. Specifically, Stereo D converted all five of the Disney-era *Star Wars* films, dating back to 2015, and they were the lead vendor on all 13 of the MCU films during that same time frame.

Aaron Parry, Stereo D's chief creative officer and executive vice president, has been involved at the company since almost the beginning. While working at Paramount, Parry worked with Stereo D for *Jackass 3D* (native 3D + Stereo D ver., 2009), and it was after this collaboration that William Sherak hired him as CEO: "I was employee number 12."[144] Part of Parry's job was to grow the company, and in part, he did so through active recruitment at colleges like the Savannah College of Art and Design in Georgia and the DAVE School in Florida, courting students studying animation and visual effects. Such collaborations developed into continued relationships, with the DAVE School integrating Stereo D "theories and techniques" into courses that allowed Parry to better evaluate possible employees. Parry puts it, "I actually probably brought on the first 250 employees personally."[145] It was after Deluxe acquired Stereo D that Parry moved to his positions as CCO and EVP.

Thus, since the DNEG merger, only three companies have dominated the 2D-to-3D conversion market: DNEG, Legend3D, and Stereo D. This relatively small number seems unsurprising given how DNEG's Becker describes the difficulties before Gener8 really found its footing: "You have this ramp up and ramp down that is very extreme in conversion. You just

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[143] Carolyn Giardina, "Deluxe Entertainment Acquires StereoD," *The Hollywood Reporter*, May 15, 2011, https://www.hollywoodreporter.com/news/deluxe-entertainment-acquires-stereod-189845.

[144] Parry, in interview by the author, June 10, 2019.

[145] Parry, in interview by the author, June 10, 2019.

need so many people for such a short amount of time. It's very hard to flow the cash and everything else, and have the technology that is able to withstand such a huge ramp."[146] Given the combined pace and workload of 3D conversion, multiple companies often convert different portions of the same movie, similar to how multiple visual effects vendors typically work on any given film. Each of the 2D-to-3D conversion companies seems fundamentally aware of the conversion landscape, with their executives referring to competitors to more clearly define their own company's creative work. From my observations, this seems like a relationship that is typically polite but not without its tensions. Jared Sandrew recalls that, when he represented Legend3D at the 2014 3D Creative Summit, he attempted to introduce himself to a Prime Focus employee who instead "pushed him aside."[147]

In my interviews, the 3D conversion practitioners would refer to competing companies using techniques first pioneered by their own company. As Stereo D's Parry says, "Not to name any companies, but I know for a fact some have completely abandoned their process and have hired people from ours to try to emulate it as much as possible."[148] Similarly, DNEG's Becker explains, "We were responsible for pioneering a couple of work flows that now everyone claims that they've always been doing, but it's actually a lie. Most of the really technical stuff that exists in 3D conversion comes from Gener8. It's just that everyone copied us."[149] Perhaps most significantly, in 2015, Prime Focus would bring a patent lawsuit against Legend3D. Legend's then-CEO Brian Robertson response to the suit suggests his frustration: "Recently, we have been gaining significant market share in 2D to 3D conversion, so it is not surprising to see the

[146] Becker, in phone interview by the author, March 1, 2019.

[147] Jared Sandrew, in interview by the author, May 16, 2019.

[148] Parry, in interview by the author, June 10, 2019.

[149] Becker, in phone interview by the author, March 1, 2019.

meritless claim made today."[150] In 2017, the U.S. Patent and Trademark Office's Patent Trial and Appeal Board invalidated all of Prime Focus's claims.[151] Looking back, Legend3D founder Barry Sandrew says the lawsuit was "odd": "They created their own patent, and then for some reason, they went after Legend. I think Legend was doing very well back then … I think that Prime Focus, looking back on it, probably regretted doing that."[152] Thus, these companies clearly see each other as direct competitors, emphasizing the importance of studying their histories and their work as its own unique object of study.

Even if these three or four companies find themselves competing for studio projects to convert, they still share the goal of promoting 2D-to-3D conversion as a legitimate creative process. Although the rationalizations for work are sometimes tied to the specifics of their particular projects, their explanations also often overlap, with key themes recurring in the justification for the work. To this end, the next section will continue the counter narrative of 3D conversion by introducing the ways in which 3D conversion professionals have built relationships with the Hollywood studios and, in that process, developed ways of reframing 3D conversion as creatively driven and consistent with the authorial visions for particular movies.

Reframing 3D Conversion: Creative Labor, Authorship, and Legitimacy

Working amidst such widespread skepticism regarding 2D-to-3D conversion, 3D companies use interviews for public press and promotional materials to emphasize the value of

[150] Eriq Gardner, "'Avengers' 3D Firm Brings Patent Lawsuit Against 'Divergent' 3D Firm," *The Hollywood Reporter*, March 31, 2015, https://www.hollywoodreporter.com/thr-esq/avengers-3d-firm-brings-patent-785464.

[151] Bryant Frazer, "Prime Focus Loses Its Fight with Legend 3D over Patented Stereo Conversion Technology," *StudioDaily*, September 27, 2017, http://www.studiodaily.com/2017/09/prime-focus-loses-fight-legend-3d-patented-stereo-conversion-technology/.

[152] Barry Sandrew, in interview by the author, March 18, 2019.

their creative work. In developing the following section, I identified recurring themes in 3D conversion self-explanations through a survey of Prime Focus's project-centric webpages, which date from 2012 to 2015 and are no longer available as of this writing (except through Internet archiving projects such as the Wayback Machine). Although DNEG's current website lists Prime Focus 3D conversions dating back to 2010, its links direct to project pages with descriptive blurbs that are much shorter than their predecessors (fig. 4).[153] Competing conversion companies also have online filmographies, but Stereo D's "Projects" page only links to company-specific credits lists, and Legend3D only features short paragraphs that read more like generic copy promoting the films in general.[154] By contrast, each of the pages on the original Prime Focus site functioned as a news release focused on a specific film, featuring details about the conversion process and quotes from key creative personnel at Prime Focus. These posts emphasize the intensive labor and attention necessary to convert a 2D film into 3D, and ultimately, these elaborations of the creative process attempt to further legitimate conversion as a filmmaking craft. I further contextualize and build on my analysis of these website posts with quotes from other relevant articles and my original interviews with executives and supervisors from the conversion companies. Ultimately, this section wrestles with questions of authorship not uncommon to all below-the-line crafts. 3D conversion professionals' explanations of their work

[153] For example, while the current DNEG post on Tim Burton's *Frankenweenie* (ver., 2012) features 83 words, the original Prime Focus post featured 606 words. The latter included several quotes attributed to Prime Focus personnel, while the former includes no such quotes. Also, DNEG's current list of stereo films is less comprehensive than Prime Focus's previous filmography, with titles such as *Clash of the Titans* now omitted entirely. Relatedly, the DNEG list excludes Gener8 projects prior to that smaller company's absorption by Prime Focus, [e.g. *300: Rise of an Empire* (Gener8 cr., 2014).] Post on *Frankenweenie*, Prime Focus, accessed May 11, 2014, http://www.primefocusworld.com/frankenweenie; Post on *Frankenweenie*, DNEG, accessed February 20, 2020, https://www.dneg.com/show/frankenweenie/.

[154] Possibly of note, as of this writing, Legend3D's website does not appear in a Google search for "Legend3D," perhaps forecasting that site's own fall from grace. "Projects," Stereo D, accessed February 20, 2020, http://www.stereodllc.com/projects/; "Work," Legend3D, accessed February 20, 2020, https://legend3d.com/work/vfx/.

suggest how they strike the balance of claiming the work as both their own, and as part of a unified creative vision. If the director is not the author of the 3D conversion, then who is? The notion of director-as-auteur has always flown in the face of film's collaborative nature, both at the level of production and with relation to studio control over projects. However, this problem is uniquely exacerbated in instances where the film may even cease to be recognized as a certified copy of the "original." The discourses outlined below suggest the complex ways in which 3D conversion professionals negotiate their roles in stereoscopic filmmaking.

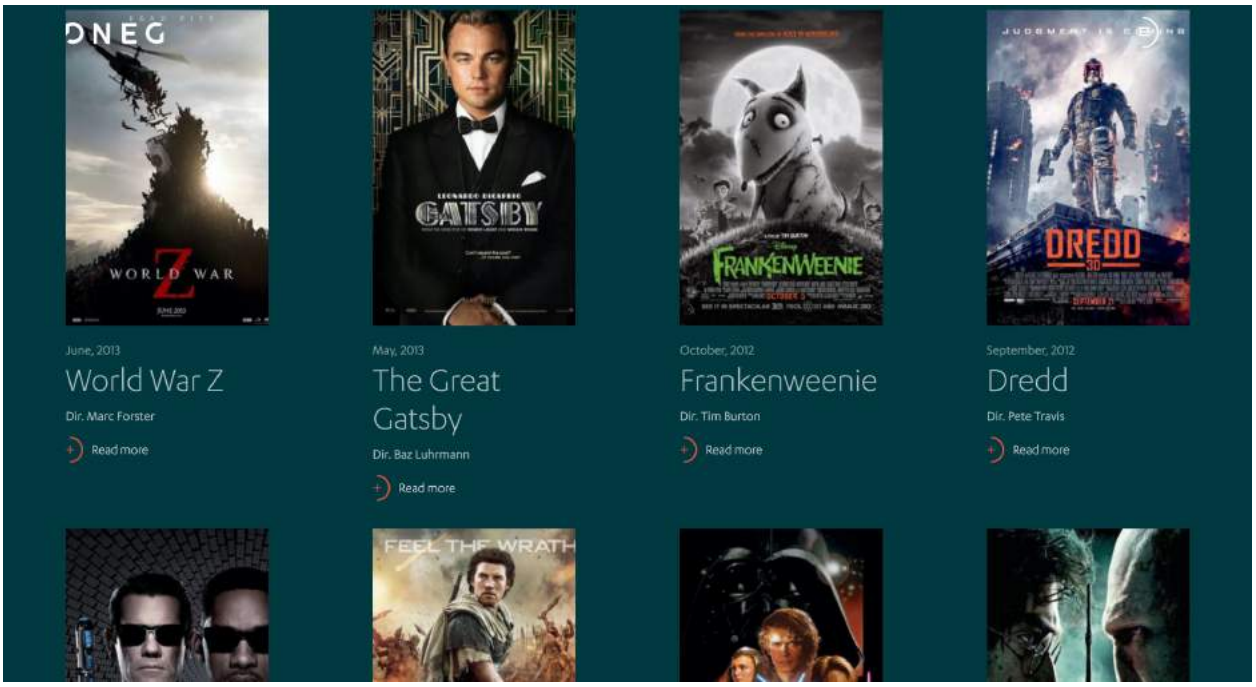

Figure 4: DNEG's current online filmography includes titles dating back to 2010 but only links to short blurbs about the individual projects. Source: "Stereo Archives," DNEG, accessed February 20, 2020, https://www.dneg.com/shows/?category_name=stereo.

This section sketches out how 3D conversion companies present themselves to potential moviegoers seeking information about a film online, and to their prospective "clients," the Hollywood studios. In fact, the 3D conversion companies' websites seem primarily directed at prospective clients looking to convert their 2D content. The overview section of the now-defunct Gener8 website promised "guaranteed quality," and "proven speed and results." Further, their

mission statement was clear: "to make it easy for filmmakers and studios everywhere to realize their creative vision in 3D."[155] Using similarly client-centric language, Prime Focus's "About Us" page circa 2015 directly addressed filmmakers: "At Prime Focus, you'll never hear us question whether it is possible ... We'll simply collectively ask ... What do you want to create?"[156] I see these websites as representative of how the 3D conversion companies *pitch* themselves, particularly in relation to native 3D and to competing 3D conversion companies. DNEG's Ben Breckenridge specifically uses the language of pitching. Breckenridge recalls when he and his colleagues "pitched [their] process" in the early Gener8 days, trying to make a name for themselves as a relatively smaller vendor in an initially crowded field of companies.[157] John Thornton Caldwell analyzes pitching in the context of narrative and packaging for writers, but his characterization of that particular ritual also applies to pitching a creative/technical process: "Pitching describes the interpersonal ways that both are enacted and performed among individual creators within the production/development chain."[158] My analysis in this section thus considers the websites and the companies' networking strategies as performances in which 3D conversion companies can present their work with concrete, readily understood details that serve to assuage studios' potential anxieties concerning 3D conversion.

Underlining the importance of relationships with filmmakers, some 3D conversion executives are responsible for fostering relationships with studios to ensure comfort with the 3D process. Paul Becker describes his job previously at Gener8 and now at DNEG as, in part, being

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[155] Overview, Gener8, accessed February 17, 2017, https://www.gener8.com/about/overview/.

[156] "About Us," Prime Focus, March 17, 2015, accessed October 29, 2019, Wayback Machine Internet Archive, https://web.archive.org/web/20150317151809/http://www.primefocusworld.com/about/.

[157] Ben Breckenridge, in phone interview by the author, June 18, 2019.

[158] John Thornton Caldwell, *Production Culture: Industrial Reflexivity and Critical Practice in Film and Television* (Durham: Duke University Press, 2008), 81.

a "company advocate with the client." Becker feels that he was particularly qualified to address the concerns of filmmakers because he previously worked as what he calls a "guerilla filmmaker," attempting to independently make features of his own. Drawing on his experiences, Becker was "lucky enough to be able to make connections with filmmakers and let them understand that we weren't there to make their work look shitty."[159] That is, he understood the countless challenges of making a film and could thus sympathize with apprehensive directors who had only heard horrible things about 3D conversion. During his tenure as president of Legend3D from 2010 to 2012, Rob Hummel spent much of his time building on preexisting relationships with studio executives, building on his long career at companies including Disney, DreamWorks, Sony, Technicolor, and Warner Bros. Hummel said that Legend3D "wanted access to my rolodex and people I knew." Given its Carlsbad location, Legend3D initially had difficulty building relationships with the studios: "People wouldn't return their phone calls." Hummel "was able to get people to meet with us, screen our materials," and he helped Legend3D land the jobs to convert Disney's *The Little Mermaid* and Paramount's *Top Gun*.[160] While Becker and Hummel have drastically different backgrounds in the film industry, they both drew on their knowledge and relationships to represent the interests of 2D-to-3D conversion companies.

Perhaps most interestingly, despite serving as a liaison on behalf of 2D-to-3D conversion, Hummel is not a fan of 3D himself. Although he became a spokesperson for 3D at both Prime Focus and Legend3D, Hummel makes it clear that he is not personally a fan of stereoscopic filmmaking. Hummel is an expert on film technology more broadly, having developed much of

[159] Becker, in phone interview by the author, March 1, 2019.

[160] Hummel, in phone interview by the author, May 6, 2019.

his knowledge as a director of production services at Technicolor from 1983 to 1988. In this role, he handled films all through the post-production process, meaning he got his hands on what he describes as "every conceivable film format." This work included restorations of the 3D classic *House of Wax* (1953) and dailies for *Captain EO* (1986), the Michael Jackson-starring 3D Disney theme park attraction.[161] Further, Hummel has written primers on stereoscopic filmmaking for the American Society of Cinematographers, and presented on the subject for the Academy of Motion Picture Arts and Sciences.[162] In essence, Hummel's knowledge on 3D allows him to play the role of instructor and advisor. And yet, he is incredibly frank about his personal reservations about the technology. To explain his resistance, he cites the limitation of binocular perception for human beings, the unnatural decoupling of convergence and accommodation, and, perhaps most relevantly, the prevalence of applications he sees as "distraction[s] from great storytelling."[163] While Hummel's technical expertise and straight-shooting might seem a far cry from the promotional speak of the Prime Focus posts I will analyze below, they both exemplify how 3D professionals use education as a tool of persuasion for skeptical viewers and prospective clients.[164]

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[161] Florian Freitag has written about the relationship between movies and theme parks, including a mention of *Captain EO*. Heather Birdsall has researched *Captain EO* in terms of intertextuality and immersion. Hummel, in phone interview by the author, May 6, 2019; Florian Freitag, "'Like Walking into a Movie': Intermedial Relations between Theme Parks and Movies," *The Journal of Popular Culture* 50, no. 4 (2017): 704-722; Heather Birdsall, "Context as Content: *Captain EO*, Intertextuality, and the Immersive Theme Park Experience," paper presented at the annual conference for the Society of Cinema and Media Studies, Montreal, Quebec, Canada, March 25, 2015.

[162] Robert C. Hummel III, "*3-D Stereoscopic Cinematography*," in *American Cinematographer Manual*, 10th Edition (The ASC Press, 2013), 193-205.

[163] Hummel, in phone interview by the author, May 6, 2019.

[164] I use the term "education" here in a general, symbolic sense, but elsewhere, Stereo D's Graham D. Clark has argued against such a characterization of his own company's discussions with filmmakers: "It's not an education because these are very experienced DPs and directors and I'm in no way whatsoever educating them. That would be insulting because they've been doing 3D composition and composing for decades; they've been looking at the great masters and the fine arts." Celine Tricart, *3D Filmmaking: Techniques and Best Practices for Stereoscopic Filmmakers* (New York: Routledge, 2017), 87.

A key strategy throughout Prime Focus's posts is the conclusion of concrete numbers that highlight the amount of work that goes into a 2D-to-3D conversion, countering the assumption that it is a lazier alternative to shooting in native 3D. In a post for *World War Z*, the company notes, with "nearly 400 artists working on the conversion across London and Mumbai, PFW utilized its global pipeline to ensure that Corey and the filmmaking team were provided with the scale, experience and flexibility they required to ensure their stereo vision was realized."[165] 400 itself specifically represents the number of "artists," a term that highlights the creativity of conversion, and as I will address in more detail shortly, Prime Focus highlights how its global operations facilitate the labor-intensive process. Even more impressively, for Tim Burton's stop-motion animated *Frankenweenie* (ver., 2012), "2,000 artists, production and support staff" delivered "1,518 3D conversion shots."[166] By emphasizing just how many individuals are needed for 2D-to-3D conversion, Prime Focus briefly cites the materiality of 3D conversion, something that can otherwise be an amorphous, invisible, and thus dismissible technological trick.[167]

At other times, Prime Focus will reference the numbers not of personnel but of the sheer magnitude of the films they convert. Contextualizing its 3D conversion of Bernardo Bertolucci's *The Last Emperor* (ver., 2013), Prime Focus notes that a specific challenge was "the size and scale of the scenes captured, including armies of thousands; 19,000 extras were used over the

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[165] Post on *World War Z*, Prime Focus, accessed May 11, 2014, http://www.primefocusworld.com/world-war-z.

[166] Post on *Frankenweenie*, Prime Focus, accessed May 11, 2014, http://www.primefocusworld.com/frankenweenie.

[167] The image of (many) individual artists in a large-scale operation is far from new. Consider histories of Walt Disney's animation studios, which sometimes suggest a tension between the individual worker and the factory setting: "Even among the most local employees there was a sense of being lost in a large, impersonal, bureaucratic atmosphere. [Ward] Kimball, for example, complained that artists were not 'factory workers. They're not putting fenders on Ford, or nuts on bolts, they're trying to do a good creative job.'" Moreover, these factory modes of production have historically been gendered. Women dominated the inking and painting departments at Disney starting in the mid-1930s, and yet, Erin Hill notes a specific instance of how women were explicitly excluded from the "creative work in connection with preparing the cartoons for the screen." Steven Watts, *The Magic Kingdom: Walt Disney and the American Way of Life* (Columbia: University of Missouri Press, 1997), 207; Erin Hill, *Never Done: A History of Women's Work in Media Production* (New Brunswick: Rutgers University Press, 2016), 80-81.

course of the film, and the Chinese army was drafted in to accommodate."[168] This information does not detail the work of Prime Focus's creative workers, and indeed, this production information concerns a film originally released 26 years prior to the 3D premiere. However, by emphasizing their close attention to the film's numerous moving parts, the company can reframe the perceived desecration of a film classic as an appreciation of the film's original aesthetic achievements. The project thus "required lots of attention to detail and heavy rotoscoping in order to allow the View-D artists to create the necessary depth."[169] The idea of "attention" shows how, to an extent, quality accompanies quantity, that a production of this scale required a great deal of work, but that Prime Focus was up to the task.

Part of why Prime Focus can deliver on its promises is because of the globalized nature of its workforce and the pipeline that facilitates this international labor. After noting that *The Legend of Hercules* (native 3D + ver., 2014) required 147 stereo shots in just three weeks, senior stereographer Ben Murray says, "With our mature conversion pipeline out of Mumbai, we were able to work on shots around the clock, using the time difference between Vancouver and Mumbai to transfer elements between sites and share the work."[170] Thus, not only is the work force large; it also transcends the bounds of time. The entry for *Sin City: A Dame To Kill For* (native 3D + ver., 2014) similarly suggests that "With teams crossing a total of four time zones and three continents, coordination was key to managing Prime Focus World's work on *Sin City:*

[168] Post on *The Last Emperor*, Prime Focus, accessed May 11, 2014, http://www.primefocusworld.com/the-last-emperor.

[169] Post on *The Last Emperor*, Prime Focus, accessed May 11, 2014, http://www.primefocusworld.com/the-last-emperor.

[170] Post on *The Legend of Hercules*, Prime Focus, accessed May 12, 2014, http://www.primefocusworld.com/the-legend-of-hercules.

A Dame to Kill For - 24 hours a day, 6 days a week."[171] Prime Focus's creative advantage is not simply that the company has offices around the world but that it is well equipped to allow for ease of communication among all of its components.

It is important to note that 3D conversion companies are not exceptional for emphasizing the scale of their operations, as visual effects companies have long made similar points. For instance, the website for vfx company Digital Domain circa 2018 explicitly mentioned that "We have offices in Los Angeles, London, Vancouver, Beijing, Shanghai, Taipei, Hong Kong and Hyderabad."[172] My point here is not to suggest these discourses of labor and attention are somehow exceptional, but rather that in the context of 3D conversion, these themes specifically function to undercut the assumption that post-production 3D is somehow an easy out for the studios. Further, writing on visual effects, Hye Jean Chung criticizes such discourses of global cooperation as serving a dominant economic order: "The rhetoric of seamless integration is thus deployed to achieve neo-Taylorist objectives, such as efficiency, labor productivity, and fluid continuity."[173] I see the issue of global production in 3D conversion as an area for further research, but for my purposes here, I am most interested in how 3D conversion companies use such rhetoric to highlight the extent of their creative labor in the face of dominant cultural understandings of conversion as mere afterthought.

While the discourses of scale and globalization might help legitimize 3D conversion to an extent, these traits in isolation might not be enough for some skeptical filmmakers. Thus, 3D conversion companies crucially highlight their active cooperation with other companies and

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[171] Post on *Sin City: A Dame to Kill for*, Prime Focus, accessed February 20, 2015, http://www.primefocusworld.com/sin-city-a-dame-to-kill-for.

[172] "About," *Digital Domain*, accessed January 29, 2018, http://www.digitaldomain.com/about/.

[173] Hye Jean Chung, *Media Heterotopias: Digital Effects and Material Labor in Global Film Production* (Durham: Duke University Press, 2018), 25.

creative personnel, including stereographers, other 3D companies, and visual effects vendors. Just as multiple visual effect vendors commonly work on different elements of a single movie, a conversion company must sometimes work alongside their competitors to deliver a 3D conversion. In discussing such cases, Prime Focus would enumerate its specific contributions and also note active communication with creatives outside of its own walls. For *The Amazing Spider-Man 2*, Prime Focus "swung into action to deliver 3D conversion services for a total of 430 shots making up 25 minutes, or about 20 percent of the entire film, working closely with Sony Pictures Entertainment stereographer Ed Marsh and primary 3D conversion company Legend 3D throughout the process."[174] And indeed, the end credits for Sony's 2014 superhero film feature the names of both Legend3D and Prime Focus. However, while still acknowledging that they were not the primary creative force on the 3D for the film, ultimately working alongside and under Marsh and Legend3D, they want to be clear about just how much they contributed to this film.

By evoking cooperation with other filmmakers, 3D conversion companies can legitimize their work as consistent with a unified artistic vision. The notion of multiple companies working on a single work might suggest that these companies are somehow interchangeable, that if each company works independently on their own scenes and sequences, the 3D conversion will still turn out as an acceptable product. By highlighting their own deference to a competitor such as Legend3D, Prime Focus suggests that they acknowledge the importance of artistic intent with the 3D conversion. Not all conversion houses may see a particular project in the same way, and the open lanes of communication for these companies allows them to work, ostensibly, as a unified artistic voice.

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[174] Post on *The Amazing Spider-Man 2*, Prime Focus, accessed May 10, 2014, http://www.primefocusworld.com/the-amazing-spiderman-2.

The Prime Focus site quote concerning *The Amazing Spider-Man 2* also highlights a key aspect of 2D-to-3D conversion: working with studio-side stereographers or stereoscopic supervisors. Simply put, stereographers and stereoscopic supervisors oversee the 3D for a given film. However, there are typically *multiple* individuals with one or both of these titles on a given project: some employed at a specific conversion company, and some aligned with the studio and filmmakers. For example, the quote about *The Amazing Spider-Man 2* mentions "stereographer" Ed Marsh as a representative of Sony, not of Prime Focus or Legend3D, but Legend3D's James Prola is also credited as a stereographer for his own work on the same film. In a sense, emphasizing cooperation in the service of a unified artistic voice can thus mitigate how overlapping job titles suggest a wider variety of voices in the mix.

The crucial relationship between 3D conversion company and studio-side supervisor is perhaps best embodied by those individuals who have worked on both sides of the equation, or who blur the distinction between the two jobs. For example, Jared Sandrew, formerly of Legend3D, now works as a stereoscopic supervisor for Disney, specifically overseeing the studio's live-action features such as *Dumbo* (DNEG cr., 2019) and *Aladdin* (DNEG cr., 2019). Sandrew admits that there was a learning curve when he took on the new role at Disney, particularly in terms of how hands-on he could be with the conversion: "Oh, you mean I can't just jump into the script and fix it? I have to talk somebody through it? … I did a little bit of that at Legend, but I also knew the person that was doing the work. Now it's three degrees of separation to that person, which is a little impersonal, and I wish there was a way around that."[175] Even if Sandrew is not as close to certain aspects of the 3D conversion process as he may wish, he has developed what he calls a "shorthand" with frequent collaborators such as DNEG: "We're

[175] Jared Sandrew, in interview by the author, May 16, 2019.

at the point now where they can pretty much get 80 percent of the way there, of what I'm looking for, first pass."[176] As with other creative collaborations, the professionals on both sides of the vendor-client relationship develop ways to most effectively work together.

In a similar example of a 3D professional crossing the lines between conversion vendor and studio-side stereographer, DNEG's Ben Breckenridge now supervises 3D as both a conversion company employee *and* a studio representative. Breckenridge first pitched the hybrid role to the studios: "'Say, why don't you just let me supervise the film?' After a few years, I had more experience than all of these third-party supervisors because I'd be working on four films at once in my studio with four different client-side supervisors. I ended up (working on) tens of thousands of shots in the amount of time that they may have just worked on one film."[177] In his new hybrid role, Breckenridge is contracted by Warner Bros. as a stereoscopic supervisor, but he continues to oversee production within the DNEG facility. According to Breckenridge, this allows the studio to save money, as they no longer have to hire a third party to supervise the 3D conversion vendor. Additionally, as I will further discuss in Chapter 3, this hybrid job allows for a continuity of vision across films in a franchise; specifically, Breckenridge currently oversees the 3D for all of the films in Warner Bros.'s DC Extended Universe. Although their specific circumstances are different, Breckenridge and Sandrew both demonstrate how the studios see professionals with 3D conversion experience as those best equipped to oversee the 3D creative process.

Connecting them more directly to the 2D production process, 3D conversion companies also often highlight their cooperation with visual effects vendors. Former Gener8 CEO Rory

[176] Jared Sandrew, in interview by the author, May 16, 2019.

[177] Ben Breckenridge, in phone interview by the author, May 21, 2019.

Armes once described his 3D conversion company as "[working] in parallel with all of the visual effects companies and all the post-production."[178] On a number of occasions, Prime Focus site highlighted its clear lines of communication with visual effects vendors. The entry on *Guardians of the Galaxy* (Stereo D and Prime Focus cr., 2014) noted that their "hybrid stereo pipeline" allowed the company to "communicate with VFX vendors and share data back and forth to create a high quality stereo VFX element, such as the Xandar fighter jets, in a shorter amount of time."[179] Thus, 2D-to-3D conversions are in direct communication with the companies producing the visual effects, troubling the notion the stereo conversion process is simply done after the fact and in a manner detached from the primary 2D production process. Similarly, for *Teenage Mutant Ninja Turtles* (Stereo D and Prime Focus cr., 2014), Prime Focus "worked alongside ILM to develop an efficient pipeline between the two facilities which allowed the team to spend more time on the actual conversion and make the most of the short production time frame."[180] Here, a 3D conversion company aligns itself with the more legitimated profession of visual effects and, more specifically, associates itself with Industrial Light & Magic, a respected established name in the entertainment business. As Julie Turnock puts it, "the story of special effects since the 1970s is largely the story of ILM and its economic domination, and its enormous success in setting the style for realism in the cinema."[181]

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[178] STORYHIVE, "myVancouver Gener8 Media: Converting 2D to 3D Film."

[179] Post on *Guardians of the Galaxy*, Prime Focus, accessed August 7, 2014, http://www.primefocusworld.com/guardians-of-the-galaxy.

[180] Post on *Teenage Mutant Ninja Turtles*, Prime Focus, accessed September 5, 2014, http://www.primefocusworld.com/teenage-mutant-ninja-turtles.

[181] Julie A. Turnock, *Plastic Reality: Special Effects, Technology, and the Emergence of 1970s Blockbuster Aesthetic*. (New York: Columbia University Press, 2015), 3.

Such an emphasis on relationships visual effects vendors also emerged during my conversations with 2D-to-3D conversion practitioners. Paul Becker describes how Gener8 worked with the visual effects vendors on *Ghost Rider: Spirit of Vengeance* (Gener8 and Legend3D cr., 2012). Becker remembers potential concerns about converting the fire that emerges from the titular character's body and bike into 3D: "It's really almost impossible to make [fire] look right." To address this challenge, Gener8 converted the shots before visual effects were finished, and the visual effects vendor shared its match move cameras, essentially the data about the images and its camera movements which vendors use to build their effects.[182] With all of this prep work, Gener8 could give the converted photography to the vfx vendor, who could then "render fire and composite that onto the plate, and it looked fantastic."[183] In essence, Becker describes a seamless integration of visual effects and 3D conversion that problematizes the notion of 3D as an afterthought. Instead, 3D conversion is a parallel process with visual effects, and it is precisely this simultaneity that allows for the native stereo rendering of visual effects elements. Gener8 used a similar pipeline for its (uncredited) work on *Iron Man 3* (Stereo D cr., Gener8 uncr., 2013), namely on the sequence in which Tony Stark uses holograms to investigate the scene of an unexplained explosion at the Chinese Theatre.

Becker explains how this integration with visual effects vendors went a step further when Gener8 employees started going to visual effects vendors facilities in order to harvest the elements they needed for 3D conversion. Becker says that before Gener8 took this approach, visual effects vendors would give elements to the 3D conversion companies, but often, Gener8

[182] Julie A. Turnock describes the role of pre-digital match moving in the visual effects production for the original 1977 *Star Wars*: "Motion control is a computer-controlled camera developed for *Star Wars* that had the benefit of being able to perfectly repeat the same movement time after time. Instead of having to 'lock down' the camera to make composite shots, a camera movement could be created virtually by building up elements through identically matching movement." Turnock, *Plastic Reality*, 90.

[183] Becker, in phone interview by the author, March 1, 2019.

could benefit from working with more than what was provided. Gener8's increased collaboration with visual effects vendors came to fruition when working with the now-defunct Rhythm & Hues: "They had this proprietary system … They didn't have enough people that even knew how to run it for their own needs. Now we came along and said, 'We need this and this and this,' and they said, 'We can't. We don't have the time.'"[184] So, instead, Rhythm & Hues trained Gener8 employees on how to use the system. This allowed Gener8 workers to harvest the elements themselves, as they were the individuals who would best know what they did or did not need for the 3D conversion process. Similarly, for *300: Rise of an Empire* (Gener8 cr., 2014), Scanline VFX facilitated the 3D conversion process by giving Gener8 not only a few layers of visual effects, as was the norm, but the "entire comp," or composite. Because of this access, Gener8 could "trick the comp and make it think it was a stereo comp … We were telling the computer it was actually in 3D."[185] Once again, the 3D conversion company used specific infrastructural advantages to efficiently produce a high-quality 3D version of a film.

Throughout this section, I have used Prime Focus's now-defunct site as a starting point for understanding how 2D-to-3D conversion companies present themselves to the public and to the industry. Ultimately, I see Prime Focus's posts as *both* valuable sources of information about the 3D conversion process, and self-promotional materials designed to present the company in the best possible light to potential clients, studios or filmmakers. Indeed, because each Prime Focus post seems most focused on justifying the 3D conversation of the particular project, the explanations sometimes contradict each other. As previously mentioned, Prime Focus highlighted that its collaborations with ILM were smooth and ultimately conducive to

[184] Becker, in phone interview by the author, March 1, 2019.

[185] Becker, in phone interview by the author, March 1, 2019.

productivity. But in the post for *Sin City: A Dame to Kill for*, the company alternately prides itself on being both a visual effects company *and* a 3D conversion company. The post quotes senior stereographer Justin Jones emphasizing just how great it was to have the various creative forces on the project in the same company, sometimes in the same office: "Our stereo artists could work closely with the VFX compositors. The VFX supervisors could walk into my office and ask me questions about the stereo for a shot directly. If we had been working with a number of different VFX vendors it would have slowed the process down. The stereo team also had access to all the VFX elements – if we needed something we could just log into the file server, grab what we needed and have one of our team render it."[186] In a sense, Jones's comment betrays that some conditions are more ideal for 3D conversion than others, that cooperation with ILM might be nice, but cooperation within Prime Focus might be better. I do not dismiss such discursive tensions—some might say contradictions—as mere evidence of spin. Rather, I see these as indicative of how 3D conversion companies seek to the make the most of whatever the specific production circumstances might be, both in terms of their actual creative work and also their own self-theorizing.

2D-to-3D Conversion, Greater Than or Equal to Native 3D

As the previous section has detailed, 2D-to-3D conversion companies strategically reframe their work as creatively motivated and as consistent with authorial intent. This implicitly counters the assumption of 3D conversion as an automated process inherently inferior to native stereo capture. Taking a step further, some defenders of 3D conversion will even highlight what they see as the creative limitations of native 3D. That is, they argue, converted 3D is not worse

[186] Post on *Sin City: A Dame to Kill for*, Prime Focus, accessed February 20, 2015, http://www.primefocusworld.com/sin-city-a-dame-to-kill-for.

than native 3D and, in some ways, it might actually be the better option. There are a number of technical reasons why 3D conversion professionals see their own process as more effective as 3D conversion, but in this section, I will largely focus on those arguments most relevant to broader questions of aesthetics.[187] My point is not to necessarily take a side as to whether 3D conversion or native 3D is "better." Instead, I analyze how 3D conversion professionals make such arguments, and I contextualize these self-theorizations of 3D with scholarly theories that parallel these practitioner discourses.

One argument suggests that 3D conversion offers greater flexibility with stereoscopic depth after production. In native 3D, the separation between left and right 3D cameras determines the stereoscopic depth cues, and indeed, filmmakers modulate such 3D-specific cues for expressive purposes. But in a blog post on conversion, ILM veteran Scott Squires lists cons of shooting in stereo, including that it "requires locking in stereo depth at time of shooting" and thus "cannot be adjusted in post."[188] By contrast, stereo conversion allows the distance between the two eyes, or interocular distance, to be fine-tuned and manipulated for technical or creative

[187] In one example of a more explicitly technical rationale, Barry Sandrew sees faults in stereoscopic image capture using over/under camera systems. At its most fundamental, 3D photography requires two cameras to record two separate images, one for each eye. Sometimes, depending on the desired distance between the cameras and the size of the cameras, 3D filming requires the cameras to not be side-by-side but perpendicular to each other. This means that one camera is shooting not straight at the subject but at the reflection off of a polarizing mirror. Sandrew says, "The mirror is typically not of the same optical quality as the lens … You have this stupid mirror in the middle of it, and the mirror affects water, anything that's shiny, any specular highlights. You get this weirdness that bugs the hell out of me. The average viewer doesn't necessarily see it, but I think they do subliminally." In other words, the complex relationship among the cameras lens, the mirror, particular objects, and lighting mean that the two cameras might result in subtle differences that make the stereoscopic image less technically precise. Similarly, DNEG's Breckenridge references how 3D native photography must be color corrected: "You're (asking) two cameras to capture the same image at the same time from different angles, so the lighting is different. Each lens and the digital sensor in the camera interprets the lighting and the perspective slightly differently." In instances where alignment is too far off, the filmmakers might simply choose to convert one of the images to 3D anyway. Relatedly, see Tricart for her interview with Corey Turner, then-Senior Vice President of Post-Production at Paramount Pictures, including a brief discussion of challenges associated with native 3D. Barry Sandrew, in interview by the author, March 18, 2019; Breckenridge, in phone interview by the author, June 18, 2019; Tricart, *3D Filmmaking*, 81.

[188] Scott Squires, "2D to 3D Conversions," *Effects Corner* (blog), August 4, 2011, http://effectscorner.blogspot.com.au/2011/08/2d-to-3d-conversions.html

reasons. That is, after a conversion company has isolated the figures in an image, they have the freedom to increase or decrease interocular distance (including over the course of a shot), move the scene closer to or further from the audience, and even move specific objects back or forward if so desired. By listing such a trait as a "con" for native 3D, Squires not only suggests a technical downside of native 3D but a *creative* limitation. In this light, 3D conversion opens up possibilities, allowing the filmmakers to free themselves from the tyranny of the interocular distance established on set. Legend3D's Barry Sandrew also makes this point, suggesting that 3D conversion is "much more creative. You can do so much more with conversion than you can do with native. Essentially, when you've done native, you've got what you've got."[189]

At the beginning of Chapter 3, I will explore cultural and theoretical attachments to cinema-as-index, and how these orientations affect the perception of 3D conversion and digital visual effects as (il)legitimate creative practices. However, I briefly address the topic here, as I see it as relevant to how critics, professionals, and scholars understand the debate of 3D conversion versus native 3D. Scholars and industry professionals alike have latched onto an understanding of film predicated on a direct relationship between image and profilmic reality, but such a theorization excludes filmmaking tools that problematize indexical realism, such as digital visual effects and 3D conversion. Thus, I find it more useful not to dismiss 3D conversion and related processes as antithetical to cinema but to situate this creative labor within a broader

[189] Similarly, Stereo D's Aaron Parry discusses the need to make decisions on set for native 3D: "Editorial will continue after the shoot. But you're making decisions based on how the shot works, and in some ways, I think that you're making compromises. You have to protect for the fact that this shot may sit next to a completely different shot than it was originally intended it to during the process of editing." By contrast, stereographer Matthew Blute leans toward native 3D precisely because such decisions can be made on set: "The director, the cinematographer, the production designer and the actors—the principle creative team in a movie—are only ever together once, on set, to create a specific scene. That creative energy will only be together once. If that creative team is looking at the images live in 3D on the set and they're making choices about how they're telling the story in a 3D environment, they are going to make better choices about how to use the 3D." Barry Sandrew, in interview by the author, March 18, 2019; Parry, in interview by the author, June 10, 2019. Tricart, *3D Filmmaking*, 88.

definition of cinema. For instance, Lev Manovich's work on digital cinema challenges the historical perception of cinema as "the art of the index."[190] Manovich proposes an alternate genealogy for the cinema, one that subsumes live-action photography under animation. He argues, digital cinema can be better understood as more akin to painting, or a "particular case of animation that uses live-action footage as one of its many elements."[191] This reconceptualization of cinema allows us to better understand 3D conversion as a creative and cinematic practice. Within this framework, the stereoscopic cinema does not necessitate the indexicality of native 3D photography and can instead include the expansive control over 3D space in post-production conversion. Indeed, when discussing the ability in conversion to push objects further back in space or to adjust scale, Jared Sandrew specifically cites conversion as the only way to achieve these ends "outside of animation."[192]

Manovich's conception of digital cinema is especially useful for conceptualizing 3D conversion companies' work on films centered around computer-generated characters. Jared Sandrew references the centrality of the visual effects in the live-action *Dumbo*, which features a CG titular character. For a given shot, Sandrew and his 3D team would receive the live-action background plate, visual effects elements for set extensions, and the computer-generated character, typically as "a Red, Green, and Blue with an Alpha Channel" with the z-depth.[193] In essence, this means the stereo team knows the visual effects vendors' math, how far the different parts of Dumbo's body are from the camera at any given time. As Sandrew explains, this means he and his team can create virtual left- and right-eye cameras, "separate them to get the volume

[190] Lev Manovich, *The Language of New Media* (Cambridge: The MIT Press, 2001), 295.

[191] Manovich, *The Language of New Media*, 302.

[192] Jared Sandrew, in interview by the author, May 16, 2019.

[193] Jared Sandrew, in interview by the author, May 16, 2019.

that we desire from [Dumbo] and then we'll build everything around it."[194] Such an approach makes sense in visual effects-driven cinema, to render the stereoscopic depth cues in terms of the primary CG character. For visual effects in native 3D photography, live-action footage would be set, and visual effects would then be conceived and rendered to fit within the space captured by the camera. This native 3D approach builds the 3D based on a cinematic index of profilmic reality, but this workflow is potentially counterintuitive if the desired emphasis is on a character not on set but rather in a computer. To use Manovich's language, 3D conversion allows filmmakers to appropriate live-action footage in the service of the computer-generated (i.e. animated) primary character.

In an especially counterintuitive twist, 3D conversion's control over live-action footage effectively gives directors the flexibility to use actual film. In this respect, digital media's perversion of the index allows the index to persist. At the 2014 3D Creative Summit, Jared Sandrew, then working for Legend3D, discussed how 3D allowed Zack Snyder to implement his vision for *Man of Steel* (2013). Specifically, Snyder "really wanted to ground Clark in the real world, and "one of the methods he wanted to use for that was he wanted to shoot film. He was able to shoot film with conversion."[195] It is remarkably ironic that to use film, a material with its own artistic and cultural capital, a director would likely use 3D conversion, a process with no artistic or cultural capital.[196] Of course, it is possible to shoot native stereo using celluloid, as this

[194] Jared Sandrew, in interview by the author, May 16, 2019.

[195] 3DCreativeSummit, "Jared Sandrew of Legend3D On Man of Steel @3DCS 2014," YouTube video, 27:58, March 31, 2014, https://www.youtube.com/watch?v=Ds0P0XrRnMs.

[196] I mention cultural capital not to claim that Zack Snyder is consciously debating such matters when making his films, but rather to suggest the contradictory aesthetics of pairing 35mm film and 3D conversion. That said, I will note that Snyder, who attended the Art Center College of Design in Pasadena, California, has admitted the potential nostalgia of his propensity for celluloid: "I always shoot film, then move into the digital pipeline. I'll be the first to admit that the future of moviemaking will be led by advances in digital technology. But the reality is there is just something about film that digital cameras still can't replicate. Call me a purist, but it's just how I feel." Zack Snyder,

was the case for all previous iterations of 3D cinema in Hollywood. However, if costs were a primary reason for the transition to digital cameras, and if the relatively large size of native 3D cameras rigs an important reason why studios have opted for 3D conversion, the prospect of two film cameras side-by-side throughout the production process seems out of the question. This celluloid-based rationalization for 3D conversion has been cited elsewhere. For *The Amazing Spider-Man 2* (Legend3D cr., Prime Focus uncr., 2014), cinematographer Daniel Mindel, who reportedly prefers 35mm, said he was hired "because they wanted to go back to shooting film."[197] This is especially significant given that the first *Amazing Spider-Man* was shot natively in digital 3D.

In addition to the micro benefit of granular stereoscopic control, 3D conversion company professionals tout the macro result of a cohesive, singular 3D experience. Disney's Jared Sandrew says that while he loves native 3D images, he feels that he has not yet seen a natively shot film that is a "complete film that blends really well."[198] Here, Sandrew connects 3D conversion with language that prioritizes classical artistic principles of unity. Similarly, DNEG's Paul Becker emphasizes how his company's senior stereographer Ben Breckenridge will watch films "over and over again" during the conversion process to ensure that the 3D blends well across shots. According to Becker, Breckenridge will "[make] sure that the depth on in incoming shot is not drastically different from the depth on an outgoing shot because then it would pop."[199] With the ability to subtly smooth transitions between shots with different levels of stereoscopic

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"Things I've Learned: Zack Snyder's 10 Golden Rules of Moviemaking," *MovieMaker*, June 11, 2013, https://www.moviemaker.com/zack-snyder-10-golden-rules-of-moviemaking/.

[197] "*The Amazing Spider-Man 2*: the Return to Celluloid," Kodak The Storyboard blog, May 1, 2013, http://motion.kodak.com/motion/about/the_storyboard/4294971572/index.htm.

[198] Jared Sandrew, in interview by the author, May 16, 2019.

[199] Becker, in phone interview by the author, March 1, 2019.

depth, DNEG's Breckenridge uses the tools of 3D conversion in the service of consistency, which serves both the film's formal integrity and the audience's viewing comfort.

As effective as it can be to highlight 3D conversion as better than native 3D in some regards, 3D conversion professionals will sometimes blur the distinctions between the two different methods of stereoscopic filmmaking. The theoretical overlap becomes apparent when one considers the details of production for historical examples of films shot in 3D. The basic principle underlying 2D-to-3D conversion is the creation of a second image for a second eye. This basic concept has precedents in changes to traditional methods of 2D effects such as matte paintings for previous iterations of 3D cinema in Hollywood. Motion pictures have long used matte paintings to fill in surroundings that are not physically present on set. For this process, optical printers composite the images to create the impression of a seamless image, and the paintings themselves often rely on two-dimensional depth cues such as linear perspective and relative size to help conceal the illusion. In an August 5, 2018, appearance at Los Angeles's Egyptian Theater, visual effects supervisor Gene Warren Jr. pointed out how 3D photography required artists to create two different matte paintings where they would have traditionally only made one, creating a second eye image that provides a slightly different perspective.[200] Such a historical example suggests that 3D conversion's process of artistically rendering a second eye might not be so separate from native 3D after all.

However, when 3D conversion professionals relate 3D conversion and native 3D, the arguments tend to be less practical and more theoretical, instead appealing to debates about the essence of cinema. As Barry Sandrew argues:

> Though it might disappoint many experts to hear this, 3D footage that is shot with cameras and that which is converted are actually both the same: both are visual effects or

[200] Gene Warren Jr., Q&A for *Spacehunter: Adventures in the Forbidden Zone*, Egyptian Theatre, Los Angeles, August 5, 2018.

> illusions. With either approach, the content comprises simulated 3D experiences that force our eyes to do some unnatural things, such as the physiological uncoupling of accommodation from convergence, an experience that would never happen normally.[201]

This note resonates with the findings of John Thornton Caldwell, that that "theoretical competence" is an important "factor in the making of contemporary movies."[202] That is, Sandrew does not simply discuss the pragmatic or artistic reasons why a filmmaker might prefer to use converted 3D but also hearkens to the very illusionary nature of cinema.

Like Barry Sandrew, Rob Hummel also appeals to 3D's status as an art form to frame native 3D and converted 3D as equal alternatives. Hummel argues, "My point is, 3D shouldn't be viewed as a reality. It's an art form. Just view it as an art form. If a filmmaker wants to do it, I don't begrudge them that fact."[203] That is, Hummel takes issue with proclamations that 3D conversion is fake 3D, as he emphasizes that all stereoscopic 3D is "fake" and differs from actual human binocular perception. Referenced by both Sandrew and Hummel, an explicit connection between art and film's un-reality also clearly echoes Arnheim's classic theories on the formalist virtues of the cinema. In delineating his argument, Arnheim says, "The basic elements of the film medium will be examined separately and compared with the corresponding characteristics of what we perceive 'in reality.' It will be seen how fundamentally different the two kinds of images are; and that it is just these differences that provide film with its artistic resources."[204] Elsewhere, film scholar Nick Jones has used Arnheim to emphasize the converted 3D of *In the*

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[201] Mark Hughes, "The Science And Future Of 3D Films, With Legend3D Founder, COO And CTO Dr. Barry Sandrew - Part 1," *Forbes*, October 25, 2011, http://www.forbes.com/sites/markhughes/2011/10/25/the-science-and-future-of-3d-films-with-legend3d-founder-coo-and-cto-dr-barry-sandrew-part-1/.

[202] Caldwell, *Production Culture*, 15.

[203] Hummel, in phone interview by the author, May 6, 2019.

[204] Rudolf Arnheim, *Film as Art* (Berkeley and Los Angeles: University of California Press, 1957), 9.

Heart of the Sea as "partial illusion" and "spatial distortion."[205] Hummel's own explanations thus further exemplify the sophisticated ways in which industry professionals theorize 3D as an art form and storytelling medium, often in ways that parallel arguments in the academy. In this instance, the skeptical spokesperson Hummel suggests that because native 3D and converted 3D are both fake, both can achieve similar results for stereoscopic filmmakers.

This last section of this chapter has outlined some of the ways that 2D-to-3D conversion companies have attempted to convince others of their work's creative legitimacy. But of course, even the best attempts at persuasion do not always pan out. Barry Sandrew said that when he was at Legend3D, he worked with Ridley Scott to discuss the possibility of converting the director's *Robin Hood* (2010) into 3D. Sandrew converted a few shots without directorial input and relying on his "own creative sense."[206] When Sandrew and Scott met to review the shots, Scott emphasized how the conversion affected his compositions. Scott criticized a shot where the 3D conversion brought too much attention to objects in the background. As Sandrew remembers, "He says that ruined the shot. 'You just ruined my shot because right now, I'm not focused on the subject matter. I'm looking way back there at the stuff in the background. It's attracting my attention.'"[207] *Robin Hood* was not released in 3D.

Despite the film not being converted into 3D, the exchange between Barry Sandrew and Ridley Scott allowed two different types of filmmakers to discuss and negotiate the creative

[205] Nick Jones, "L'illusion partielle de la 3D: distorsions spatiales, stéréoscopie et *Au Coeur de l'océan*," in *Stéréoscopie et Illusion*, trans. Frank Boulège, eds. Esther Jacopin and Giusy Pisano (Paris: Septentrion Universitary Press, 2018), 213–227. Any citations of this work apply to the author's original English version, provided courtesy of Jones. Title in English is "3D's Partial Illusion: Spatial Distortions, Stereoscopy and *In the Heart of the Sea*."

[206] Barry Sandrew, in interview by the author, March 18, 2019.

[207] Barry Sandrew, in interview by the author, March 18, 2019.

possibilities of 3D. Sandrew says that the two eventually went shot by converted shot, and Scott could instantly rate whether he thought the shot was bad or good, on a scale from 1 to 5.[208] On one hand, Sandrew gained the valuable perspective of a veteran director concerning what he believed worked or did not work in 3D. On the other hand, Scott likely walked away with more knowledge about how 3D affects shot composition. Indeed, Ridley Scott would go on to direct three movies in 3D, all shot in native 3D but with the aid of 3D conversion companies: *Prometheus* (Gener8 cr., 2012), *Exodus: Gods and Kings* (Stereo D cr., 2014), and *The Martian* (Prime Focus and Stereo D cr., 2015). By thinking of 3D conversion and the conversations surrounding it as complex processes of contestation, we can see how creative possibilities might arise even from "failed" interactions.

This chapter has established the historical, institutional, and discursive context for the various players in the debates over 2D-to-3D conversion. The next two chapters will build on the questions and themes explored above by further analyzing specific aspects of 3D conversion companies' creative work. More specifically, Chapter 2 will add another layer of cultural and aesthetic tension by considering the impact of anxieties around reformatting texts.

[208] Barry Sandrew, in interview by the author, March 18, 2019.

Chapter 2

Converted Classics: 3D Rereleases as Parallel Texts

In the 2012 episode of *The Simpsons* entitled "Adventure in Baby Getting," a movie theater's marquee presents *The Itchy & Scratchy Movie 3-D Re-Release*. Under the film's title, the theater owners frankly admit to potential moviegoers, "See What You Saw Before, Except It Costs More." Such a throwaway sight gag is a classic staple of *The Simpsons*, providing tangential cultural commentary in an overly earnest, blink-and-miss-it sign. This particular joke highlights the cultural common sense around 2D-to-3D conversions, especially for films originally released only flat. Firstly, the words "what you saw before" suggest that an additional dimension does not add anything significant. Wearing the glasses will not add aesthetic or experiential value. Secondly, the notion that "it costs more" despite this lack of added value expresses a cynicism about the financial motives of the studios for these rereleases. Audiences are paying more for the same, and studios and theaters can make money off of this scheme.[1]

Addressing the assumptions implicit in *The Simpsons* gag, this chapter will focus on the conversion of studio library titles into 3D for rerelease. Admittedly, classic titles represent a small percentage of 3D conversion companies' output. Of the major studios' 56 live-action 3D conversions released from 2010 to 2014, only five were library titles: *Star Wars: Episode I – The Phantom Menace* (Prime Focus ver., 2012), *Titanic* (Stereo D and Venture 3D ver., 2012), *Top*

[1] I acknowledge that recent seasons of *The Simpsons*, in its 24th with this episode, do not broadly attract the same level of critical esteem that its earliest seasons did. Television critics Alan Sepinwall and Matt Zoller Seitz felt the need to address the popular perception of the show as "long past its peak" when they ranked the show as the greatest American TV series of all time: "The narrative that the current show is a ghost of its former self doesn't withstand scrutiny if you pay close attention to the second half of its run." Despite the show's diminished reputation in some circles, I still see the show as evidence of what the show's writers deem to be cultural assumptions pervasive enough to riff on for a wide audience. Alan Sepinwall and Matt Zoller Seitz, *TV (The Book)* (New York: Grand Central Publishing, 2016), 28.

Gun (Legend3D ver., 2013), *Jurassic Park* (Stereo D ver., 2013), and *The Wizard of Oz* (Prime Focus ver., 2013).[2] However, I strategically use such films as an entry point into better understanding both the cultural anxieties around 3D conversion, as well as the specific issues of textuality that arise from such rereleases.

3D rereleases are far from the only example of how studios have profited off of their catalogs, nor are they exceptional for altering the "pure" form of a film text to such an end. Stereoscopic versions of older films might seem exemplary given the more obvious transformation of adding a dimension, as well as 3D cinema's own cultural baggage. However, studios have long mined their older films for ancillary revenues in the realms of theatrical re-releases, television broadcast, and home video. The first part of this chapter will contextualize the 3D conversion of 2D movie "classics" in relation to cultural skepticism about reformatting film texts more broadly. To this end, I consider various historical and contemporary examples of textual purposing, as well as existing scholarship on reformatted films. This context will show how anxieties about 3D conversion resonate with broader concerns related to a film's return in a venue outside of the theater, or in the theater in a version different from the "original."

I see 3D conversions as an example of what I refer to as parallel texts, versions of films that are nominally the same as their corresponding "originals" but that have unique formal properties.[3] In more practical terms, parallel texts are the various versions of a single film that

[2] I do not mention Prime Focus's 2013 conversion for Bernardo Bertolucci's *The Last Emperor* in this context as it apparently only screened at film festivals and did not receive any sustained theatrical run.

[3] I want to emphasize that I developed the concept of "parallel texts" from my "etic" perspective, a term that anthropologists and other social scientists use to describe an observer's view. That is, the 3D conversion companies did not explicitly use this term during our conversations. If I were to consider what the "emic," or insider's, equivalent of my term would be, the industry more broadly might emphasize not the parallel nature of these different variations but rather focus on the singular intellectual property from which these ancillary versions are derived. For 3D conversion companies, the term "parallel text" might overemphasize their work as somehow separate from the 2D "originals," which could reinforce criticisms of conversion as excessive add-ons. However, from a scholarly perspective, I find "parallel text" useful because it restores agency to 3D conversion companies and their work as

exist for consumption. Other common examples include pan-and-scan VHS tapes and films broadcasted on television with content edits and/or commercial breaks. I use the word "text" in part to move from cultural or industrial concerns about repurposing to matters of creative labor and aesthetics. The move across mediums or exhibition contexts often comes with modifications in mise en scene, cinematography, editing, or sound, and 3D conversion represents an especially pronounced material change, one that even the most casual of viewers would notice. All such modifications lead us to consider how our understandings of a film might change with reformatting, as well as how the creative workers tasked with modifying the film came to their decisions. Throughout this chapter, I emphasize the tension between the dual discursive impulses of parallel texts, those of *preservation* and *perversion*, and how the films are often strategically toeing the line between these two competing directions.

In the second half of this chapter, I use a comparative analysis of the 2D and 3D versions of *Top Gun* to better understand the aesthetic challenges and opportunities that come with conversion. I consider how the added 3D contributes to or complicates popular readings of the popular film, with a close consideration of film form. Even if 3D conversion companies more typically work on converting contemporary films for the simultaneous co-releases of 2D and 3D versions, the focus on the conversion of a well-known classic can help us to better understand the creative challenges of those working at 2D-to-3D conversion companies. I see conversion as a process of creative interpretation: The professionals at companies Legend3D, Prime Focus (now DNEG), and Stereo D must deeply engage with the formal properties of the "original" 2D version of a film text and add dimension in a way that enhances, exaggerates, or perhaps

creative interpreters in a manner that will resonate with cinema and media scholars, while still acknowledging the tensions that characterize these texts.

challenges a film's meanings.[4] Put differently, I argue that these practitioners engage in a form of industrial textual analysis not dissimilar to the work of cinema and media scholars.

My close reading of *Top Gun* draws on some publicly available materials for details about the conversion process, but for the most part, I draw on my own observations and interpretations regarding how the 2D and 3D versions work. Indeed, this represents a departure from the previous chapter, for which I relied much more on the words of 3D conversion professionals, sourced from news articles, press releases, and my original interviews. I can imagine that most of the individuals I interviewed would be aghast at the fact that I discuss a process as labor intensive as 3D conversion in the same space as pan-and-scan. As I have discussed, 3D conversion companies use public outlets such as their official websites to detail their countless hours of creative labor across the globe, as well as their close engagement with stereographers and filmmakers to facilitate a unified artistic vision. By contrast, pan-and-scan versions of films are sometimes blatantly automated and are widely seen as divorced from authorial intent.[5] However, I find such a framing not only useful for illuminating cultural anxieties about reformatting that affect the perception of 3D conversion but also for broadening my study to consider interpretive processes, cultures of movie viewing, and industry practices even more culturally suspect than 3D conversion.

[4] I do not mention Gener8, also now part of DNEG, in this particular sentence because they did not convert any of the library titles discussed here, but as I will demonstrate in the next chapter, conversions of contemporary films for simultaneous 2D and 3D co-release also necessitate this close level of formal engagement.

[5] John Belton describes a particularly egregious example of pan-and-scan: "Single fixed-position scanning often resulted in unintentional avant-garde minimalism in films that exploited the extreme edges of the frame. In a crucial sequence of *A Star Is Born* (1954), Judy Garland and Jack Carson stand talking in her dressing room at either edge of the CinemaScope frame; on television, we continue to hear them talk, but both actors are missing; all that can be seen is the space between them, occupied by Garland's dressing table and mirror." John Belton, *Widescreen Cinema* (Harvard University Press, 1992), 219.

In the previous chapter, I focused specifically on histories, scholarship, and press reports most relevant to the popular perception of 3D, past and present, as a "bad object." By moving to a discussion of parallel texts, I hope to underline the multiple, compounded layers of cultural illegitimacy that inform cultural understandings of 2D-to-3D conversion. That is, I see 3D conversion as representing the intersection of several different discourses about cultural and aesthetic legitimacy, including not only historical assumptions about stereoscopic cinema as gimmick or spectacle but also criticisms of reformatted texts and digital technologies as antithetical to the authorial and technical integrity of cinema as an art. To this end, this chapter isolates the additional discourse of parallel texts while continuing to build on the issues already explored.

Histories of Parallel Texts and Their Cultural Legitimacy

As in Chapter 1, I begin with a section focused on historical and scholarly precedents for popular perceptions of 2D-to-3D conversion. While the previous chapter focused on past iterations of 3D in Hollywood, this chapter will address cultural debates around how Hollywood studios have repurposed their film libraries for ancillary revenue streams. On a historical level, this section will examine how reformatting practices such as pan-and-scan and colorization, like 3D conversion, have been perceived as financially motivated and removed from creative intent. On a theoretical level, I elaborate my concept of parallel textuality to highlight how we might instead rethink practices of reformatting film texts as creative exercises in interpretation. Throughout this section, I will characterize various parallel texts as being relatively accepted or denigrated by cinephiles and film critics. To be sure, such opinions are far from monolithic. As with the interpretation of a film text, the reception of a particular rerelease practice is contingent

on a variety of factors, including marketing, mode of exhibition, and the background of the individual viewer. Still, I find it useful to interrogate specific possible responses to explore the assumptions and issues underlying these debates. Further, I do not address perspectives on reformatting to simply support or attack them. Rather, I hope to emphasize how cultural discourses shape viewers' understandings of media industry practices, and the vested interests that the industries have in managing these conversations.

Often in media studies, scholars study film texts as singular, bounded works. Even if scholars recognize different possible interpretations, they typically agree on the basic formal, material properties of the films themselves. However, I have already noted that 2D-to-3D conversions are but one example of the varyingly formatted versions that exist of individual films. The basic core of a film will remain consistent across various technological formats and exhibition contexts, but often, there are substantial formal and technical differences to accommodate the needs of the viewer or the distributor. Most film viewers today are likely familiar with the warning that appears before televised broadcasts and VHS films, suggesting, "This film has been modified from its original version. It has been formatted to fit this screen." This section will elaborate on various types of such reformatted films by sketching out different categories of parallel texts. This is not a comprehensive account of parallel texts, and further work can illuminate the various creative and cultural contexts for different examples. My intention here is to set up general distinctions that will help us better understand how 2D-to-3D conversions differ from and are similar to other parallel texts.

Some media scholars, especially those studying television, have paid close attention to how films have moved across formats and media.[6] Michelle Hilmes charts the evolution of

[6] Cultural hierarchies of value have arguably played a formative role in the preeminent professional organization of this academic field, particularly with regard to television. It was only in 2003 that the Society of Cinema Studies

feature films on television in her study of the relationship between Hollywood and broadcasting.[7] Hilmes notes that "between 1948 and 1955, available films tended to be British, Western, or B-quality."[8] However, the 1955 sale of the RKO library "sparked the flow of major studio features to television."[9] Further, Jennifer Porst explores the complex legal issues that affected the early history of Hollywood studios licensing features for television.[10] Perhaps the best-known early example of theatrical texts migrating to television is Walt Disney's ABC program, which repurposed old Disney short films alongside original live-action programs and theme park advertisements. Christopher Anderson notes that "before the arrival of television, Hollywood's history was virtually inaccessible to the general public, available only sporadically through the unpredictable re-release of studio features and short subjects."[11] In addition to noting the practical function of television repurposing film texts, Anderson analyzes how the framing for the content "implies that the Disney studio's products are not disposable commodities of pop culture but artifacts worthy of remembrance."[12] Similarly, Barbara Klinger underlines how the cable channel American Movie Classics (AMC), launched in 1984, positioned itself as an arbiter

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voted to change to its current name, the Society of Cinema *and Media* Studies. That is, the advent of scholarship of television was not enough to prompt a reconsideration of the society's self-definition in the preceding decades. John Thornton Caldwell spoke to such tensions when he argued in 2005 that "film now functions as a subset of television and electronic media, popular assumptions to the contrary, rather than vice-versa." John Thornton Caldwell, "Welcome to the Viral Future of Cinema (Television)," *Cinema Journal* 45, no. 1 (Fall 2005): 90-97.

[7] Michelle Hilmes, *Hollywood and Broadcasting: From Radio to Cable* (Urbana: University of Illinois Press, 1990).

[8] Hilmes, *Hollywood and Broadcasting*, 158.

[9] Hilmes, *Hollywood and Broadcasting*, 160.

[10] Jennifer Porst, "Disruptive Convergence: The Struggle Over the Licensing and Sale of Hollywood's Feature Films to Television Before 1955" (PhD diss., University of California, Los Angeles, 2014); Jennifer Porst, *Broadcasting Hollywood: Disruption, Convergence, and Feature Films on Early TV* (Rutgers University Press, forthcoming).

[11] Christopher Anderson, *Hollywood TV: The Studio System in the Fifties* (Austin: University of Texas Press, 1994), 146.

[12] Anderson, *Hollywood TV*, 146.

of cultural heritage with its presentation of classical Hollywood cinema.[13] Thus, scholars such as Anderson and Klinger understand that *how* an old theatrical text is resurrected impacts its potential reception.[14]

At times, the tension between the financial motives for repurposing films and the cultural impulse to revere older titles as classics becomes materially inscribed through formal modifications to films, resulting in what I consider parallel texts. Perhaps the most widespread and clearest form of textual modification for everyday film consumers is the reformatting of widescreen films for exhibition on a 4:3 television screen.[15] For many films, these would have been pan-and-scanned; a 4:3 image was cropped out of the larger wide image to distill necessary information for understanding the film. For other films, this may have been achieved through an open matte, with filmmakers framing for theatrical exhibition but simultaneously capturing more image that could fill a television screen. Although pan-and-scan has "less" image and open matte presentations would have "more" image, they both fundamentally change the cinematography and sometimes the editing of films.

Many scholars and film buffs would suggest that parallel texts are mere enhancements or abridgements of what is generally accepted as the "original" or "official" version of the text. According to this logic, many formats that follow the theatrical window, such as 3D rereleases, pan-and-scan VHS tapes, or films broadcasted with commercial breaks, sully the original artistic and creative intent. However, the notion of a film's "correct" version is detached from the reality

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[13] Barbara Klinger, *Beyond the Multiplex: Cinema, New Technologies, and the Home* (Berkeley and Los Angeles: University of California Press, 2006), 91-134.

[14] Jay David Bolter and Richard Grusin analyze what they see as television's remediation of film and digital media, but they do so in broader, theoretical terms than the more industry-oriented studies I cite here. Jay David Bolter and Richard Grusin, *Remediation: Understanding New Media* (Cambridge: The MIT Press, 2000), 184-194.

[15] Belton, *Widescreen Cinema*, 218-219.

of consumption. Indeed, viewers who have seen originally widescreen films on 1.33:1 VHS tapes might never see what some consider the true versions of those films, and the very fact that these might be the only versions that some viewers experience makes them just as important for scholarly study. In the case of 2D-to-3D conversion, the creation of parallel texts necessitates a great deal of specialized labor with its own technical know-how and creative imperatives. A theory of parallel texts not only considers the material reality of how films circulate but also opens up new avenues for thinking about the creative industries.

Although parallel texts might be designed for different viewing contexts, they are all ultimately designed to represent, in the cultural imaginary, a singular text. This distinction separates parallel texts from adaptations or remakes, which are also considered by critics to be derivative of an original singular vision. For example, when Warner Bros. produced *Harry Potter and the Sorceror's Stone* (2001), the effect was not for the film to replace or stand in as J.K. Rowling's 1997 novel. The film built on the novel's readership and inspired new fans to then read the book series. Hypothetically, if someone asks a friend if they have seen the first Harry Potter movie, a possible response would be, "No, but I have read the book." This marks a distinct contrast with everyday understandings of parallel texts. It is significantly less likely for someone to ask a friend if they have seen the proper widescreen presentation of *Sorceror's Stone* and receive a reply: "No, but I saw the 1.33:1 pan-and-scan version." It is more likely that they will acknowledge they have both seen the same film, as parallel texts are generally seen as interchangeable to those who are not film critics or scholars. Put more elegantly, Linda Hutcheon characterizations an adaptation as "repetition with variation," or "a derivation that is not derivative—a work that is second without being secondary."[16] In the popular consciousness,

[16] Linda Hutcheon, *A Theory of Adaptation*, Second edition (London: Routledge, 2013), 8-9.

parallel texts are more likely than adaptations to be considered without significant variation, derivative, and secondary.

Many who watched films on TV before the advent of widescreen TVs likely did not how or even if a film had been modified, but cinephiles and film historians certainly took notice. Institutions such as the cable channel Turner Classic Movies (TCM) have gone so far as to educate viewers about pan-and-scan films and their negative impact on film history. In a five-minute segment once regularly aired between films, TCM compares the textually sacrilegious pan-and-scan with the preferred alternative of letterboxing.[17] Prominent filmmakers such as Curtis Hanson, Michael Mann, Sydney Pollack, and Martin Scorsese discuss how the black bars on the top and bottom of the screen preserve the originally intended vision for a widescreen film's image. Scorsese perhaps explains this most explicitly, how pan-and-scan is "in a sense, technically, redirecting the movie." He elaborates on the effect of a pan-and-scan presentation of the 2.76:1 *Ben-Hur* (1959), particularly how the chariot scene loses stunt work and is "reduced to a confused blur." Pollock also comments on the same film, suggesting, "I get the heebie jeebies thinking about *Ben-Hur* panned and scanned. It isn't *Ben-Hur*. It becomes a home movie." These discourses emphasize that the true film exists with the images as the director intended them to be, and thus, by adding black bars to the top and bottom of everyone's TV screens, TCM is doing great work to preserve as best as possible the film for audiences as home. This short featurette is simultaneously educational and self-promoting, making an argument that the versions of the films on TCM are the "correct" versions, or at least as correct as one can get on a square-shaped TV screen.[18] The short video speaks to the lengths that media industries will go to

[17] For a discussion of letterboxing, see Belton, *Widescreen Cinema*, 226-228.

[18] Though this video, TCM seems to be carefully negotiating two potential audiences: nostalgic viewers of classic movies, and cinephilic purists. The former might have first encountered TCM's classic films through network

contextualize how they have reformatted a film, assuring cinephiles that the films have been "preserved" *and* justifying to other audiences who might simply expect their TV screen to be filled.[19]

Although television broadcasts and VHS transfers might be the most prominent examples of commercial parallel texts, colorized black-and-white films might be the most direct precedent for the conversion of 2D library titles into 3D rereleases. As noted in Chapter 1, Legend3D founder Barry Sandrew developed his 3D conversion technology by building on what he had invented for colorization. Both colorization and 2D-to-3D conversion can be characterized as attempts to update the perceived dated qualities of films to match the norms or trends of the day. For example, Frank Capra might have originally produced *It's a Wonderful Life* in black and white, but given that color images have been standard for film and television since the 1960s, content owners wanting to monetize their libraries might feel compelled to update their films for those allergic to black-and-white films. While the black-and-white and colorized versions of films can coexist, some voice their anxiety about whether the updated text will come to replace

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television broadcasts, for which the films were likely pan-and-scanned or otherwise cropped. Thus, if such a viewer is not generally aware of cinematic composition or technical details, they might see blank space on the screen as something missing. By contrast, the latter are more likely to be hyper-aware of details such as aspect ratios and only see letterboxed films as "correct." Thus, TCM's featurette strikes a balance that assures both audiences that TCM, because of its respect for how the films were "meant" to be seen, is the best choice for classic films on television.

[19] Pan-and-scan cropping of films for home video was most visible in the age of 4:3 televisions, but this type of reformatting still exists in the age of high-definition, widescreen TVs. In November 2017, director Jordan Vogt-Roberts took to Twitter to address complaints that the HBO version of his *Kong: Skull Island* (2017) switched between two different aspect ratios. Specifically, Vogt-Roberts pointed to HBO showing the airplane edit of his *Kong* film: "I begrudgingly made this version to preserve my original framing in certain sequences. Why [is HBO] playing this compromised instead of the original?" This inspired director Peter Atencio to explain a similar encounter with HBO for his film *Keanu* (2016). Atencio explained, "HBO refuses to play anamorphic movies in the correct ratio unless they're contractually obligated to. It's now the first part of any deal I make for projects." Many cinephiles may not feel that the cropping of the eighth *Kong* film or a cat-starring action comedy is comparable to the reformatting of William Wyler's *Ben-Hur*. However, cultural capital of the texts aside, these examples all suggest how media companies continue to create parallel texts to suit different viewing contexts in ways that create debates about the relationship between viewing technologies, viewers, and directorial visions. Zack Sharf, "Director Jordan Vogt-Roberts Isn't Happy HBO is Airing the Airplane Edit of 'Kong: Skull Island'," *IndieWire*, November 29, 2017, https://www.indiewire.com/2017/11/jordan-vogt-roberts-hbo-airplane-edit-kong-skull-island-1201902153/.

the original. Glenn Erickson addresses this possibility in a review of a Blu-ray including both the black-and-white and colorized versions of *It's a Wonderful Life*: "With *parallel* versions like this there's always the likelihood that the original will be set aside when somebody decides that the colorized copy is the only one people still want to see [emphasis added]."[20] This hypothetical animates cinephilic fears that the "wrong" versions of texts might be preferred once such alternatives are presented.

As Gary R. Edgerton has demonstrated, the 1980s debates over the colorization of black-and-white films often centered on the issue of authorial intent.[21] Edgerton suggests that, in the debate over colorizing black-and-white films, the "rhetorical posturing on both sides was, more often than not, disingenuous."[22] The fight over colorization "[pitted] European-based conceptions of art and morality against America's paramount allegiance to the right of private property and its attendant promise of commercial gain."[23] In other words, it was Frank Capra and Roger Ebert versus Ted Turner. Capra was one of the earliest and most vocal critics of colorization in 1985, but as Edgerton points out, Capra had originally signed a contract to allow for the colorizing of films such as *It's a Wonderful Life*. It was only after that the company Colorization Inc. discovered that the film had fallen into the public domain that they "responded by returning Capra's initial investment, eliminating his financial participation, and refusing outright to allow the director to exercise artistic control over the color conversion of his films."[24]

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[20] Glenn Erickson, *It's a Wonderful Life* Blu-ray Review, *DVD Savant*, November 7, 2009, https://www.dvdtalk.com/dvdsavant/s3065life.html.

[21] Gary R. Edgerton, "'The Germans Wore Gray, You Wore Blue': Frank Capra, Casablanca, and the Colorization Controversy of the 1980s," *Journal of Popular Film and Television* 27, no. 4 (2000): 24-32.

[22] Edgerton, "'The Germans Wore Gray, You Wore Blue,'" 24.

[23] Edgerton, "'The Germans Wore Gray, You Wore Blue,'" 25.

[24] Edgerton, "'The Germans Wore Gray, You Wore Blue,'" 26.

This fallout between Capra and those colorizing his films demonstrates how the cultural conversation often depends on whether the companies modifying or converting the film make a good faith effort to include those seen as the original creatives.

As perverse as the pan-and-scan, colorization, and 2D-to-3D conversion may seem, I still characterize them as *intentional* parallel texts. These various versions may not reflect the perceived intentions of the "true" author or director, but they still require industry professionals to make creative decisions about how to reformat the film for different viewing contexts. That is, while critics generally dismiss processes such as 2D-to-3D conversion as mere cash grabs, there is a great deal of creative interpretation involved. I use the term "intentional" to distinguish these examples from *unintentional* parallel texts. Unintentional, or accidental, examples involve oversights, technological defaults, and mistakes. For example, an individual might have their television's default settings such that a 1.33:1 image stretches to fill a widescreen 1.78:1 space. Any square in this film becomes a rectangle, any circle an oval. However, the person has still seen the film, despite the fact that the formal properties of the film have technically changed.

The discourse of intentionality here is not necessarily designed to legitimate one group of parallel texts over another. Indeed, film critics and scholars have frequently appropriated the language of intention and authorship for cultural legitimacy. Michael Z. Newman and Elana Levine lay out how the notion of an author or an auteur first legitimized cinema as an object of study but went on to become an important discourse in the age of contemporary "Quality TV."[25] In other words, the discourse of intention can be used to elevate certain media objects over others, often in ways that denigrate common understandings of popular culture. By bringing up questions of intention, I hope ultimately to foreground the ways in which certain versions of texts

[25] Michael Z. Newman and Elana Levine, *Legitimating Television: Media Convergence and Cultural Status* (New York: Routledge, 2012), 38-58.

are seen as more legitimate than others. Further, I hope to disperse authorship to a broader set of individuals in production and distribution, including to workers who format texts for different exhibition contexts.

While my focus thus far has been on culturally denigrated parallel texts, some forms of parallel texts are seen as culturally valuable. Ultimately, whether a parallel text is accepted by cinephiles or not often depends on whether it is perceived as *preserving* or *perverting* original artistic intent. This is implied in the TCM video discussed above, which positions letterbox presentations of widescreen films preserving films as they were meant to be seen, and pan-and-scan as perverting directorial visions. The tension between perversion and preservation has also played out in the reception of another form of parallel texts: directors' cuts and restored films. The examples below demonstrate how one version of the text is typically consecrated as the purest reflection of a creative vision, and all other versions are then judged accordingly.

Underlining the centrality of authorship, the question of perceived intent is sometimes more important to a version's legitimacy than whether it was released first. The 1998 release of Orson Welles's *Touch of Evil*, originally released in 1958, is a parallel text that followed the original release but is generally perceived as aesthetically and culturally superior. Reports suggest that the original 1958 version was recut and reshot by Universal without the input of Welles. Because of these changes, Welles's original rough cut reportedly does not exist. The 1998 rerelease of the film was reconstructed with available footage according to Welles's 58-page memo sent to the studio about what his vision for the film. In this particular case, the 1958 version might have come first, but it was seen as detached from the authorial intentionality of the director Welles. Despite being different from the original theatrical release, the 1998 parallel text represents an act of preservation, to return to the lost object of the rough cut that no longer exists.

Similarly, the 1992 director's cut and 2007 final cut of Ridley Scott's *Blade Runner*, originally released in 1982, are seen as the more authentic representations of what the director had in mind.

At the same time, film fans have also dismissed directorial manipulation of an older film when it was perceived as excessive, demonstrating the sanctification of particular versions as a continual process of negotiation. Authorial perversion of one's own vision is perhaps most evident with the various Special Editions of George Lucas's *Star Wars* films. Since 1997, the original *Star Wars* trilogy has been rereleased in several different versions. Each new version included new scenes, new shots, and/or upgraded visual effects using then-contemporary computer-generated visual effects. Although the Special Editions are parallel texts that are creatively motivated and consistent with authorial intent, they have been largely dismissed as perversions of the films' original versions. A *PC Magazine* article around the time of the September 16, 2011, Blu-ray release exemplifies the resistance to such changes. Entitled "Top 10 Worst Changes Made to Star Wars," the article's deck proclaims that Lucas has given fans "more to grumble about," pointing to the continued controversy around modifications for subsequent releases. The top entry on the list is the change as to whether Han Solo or Greedo shoots first at the Mos Eisley Cantina. In the original 1977 version, Han shoots first, suggesting that he is an antihero willing to kill to save himself. In the 1997 version, it was changed such that Greedo shoots first, making Han's move an act of self-defense.[26] Thus, although Lucas retains a level of authorial control, the film is seen as contradicting fan's interpretations of the film.

To reiterate, I discuss directors and authorship throughout this study not to make arguments about the absolute legitimacy of some texts of others, but rather to analyze perceived authorship affects how film critics and movie fans value different forms of parallel texts. David

[26] Meredith Popolo, "Top 10 Worst Changes Made to Star Wars," *PC Magazine*, September 16, 2011, https://www.pcmag.com/feature/287832/top-10-worst-changes-made-to-star-wars.

N. James highlights and then problematizes what he calls the "creative intention argument" in his essay on the 1980s colorization of black-and-white films.[27] James traces how critics apply such a premise to colorization. These skeptics would argue that "black and white movies were intended by their creator(s) to be seen in black and white," and "works of art should be seen as their creator(s) intended them to be seen"; thus, "black and white movies should not be seen in color."[28] However, James suggests this argument to be unsound, that "it is a mistake to define or evaluate a work of art in terms of the intentions of its creators."[29] James also addresses a second related but distinct point concerning the integrity of an artwork and its form. Here, he asserts, "The fact that an original work is modified is not a good practical/aesthetic objection to such transformation, as long as other copies of the original work of art continue to exist."[30] In other words, adding paint to a Michelangelo statue affects the original, but colorizing *It's a Wonderful Life* does not force black-and-white copies to disappear. Like James, I do not accept assumptions about cultural value and authenticity at face value, but rather, I hope to contextualize and deconstruct such value judgments, with careful attention to the specificities of different historical contexts.

The cases of *Touch of Evil* and *Star Wars* demonstrate how conceptions of originality and authorial intent, intersecting with audience expectations, can affect whether a particular parallel text is seen as legitimate or illegitimate. These are not fixed binary responses, and they show the complex terrain that 2D-to-3D conversion professionals traverse as they attempt to create and

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[27] David N. James, "On Colorizing Films: A Venture Into Applied Aesthetics," *Metaphilosophy* 20, no. 3/4 (July/October 1989): 332-340.

[28] James, "On Colorizing Films," 333.

[29] James, "On Colorizing Films," 334.

[30] James, "On Colorizing Films," 336.

justify their own parallel texts. And as discussed earlier with regard to television, home video technologies, and colorization, the technical elements of reformatted texts come with their own varied levels of cultural capital. The next section will attempt to deal with these very questions as they related to 2D-to-3D conversions. In particular, I hope to discuss how these various questions of cultural legitimacy, along with industrial churn, can make certain conversions seen as relatively successful and others as relatively poor.

Legitimating 3D Conversions of 2D Classics

James Cameron confirmed the 3D conversion of *Titanic* in July 2010.[31] Lucasfilm announced the 3D conversion of the original *Star Wars* series in September 2010.[32] *THR* reported the conversion of *Top Gun* into 3D on September 12, 2011.[33] Many of these announcements spurred online critics and journalists to ask, is a conversion even necessary? In a *Screen Rant* article about the confirmation of the *Titanic* conversion, Ross Miller asks, "Aren't we overrun already with new 3D movies without delving more than a decade into the past and converting a film for re-release?"[34] He specifically notes that this film will have to be converted into 3D, given the unavailability of "Terminator time travel technology" to shoot natively in stereoscopic, so *Titanic* conversion would likely boast the "crappy kind of 3D that comes from

[31] Ross Miller, "Titanic 3D Confirmed for 2012 Release," *Screen Rant*, July 6, 2010, https://screenrant.com/titanic-3d-2012-release/; Kimberly Nordyke, "'Titanic' 3D Gets Release Date," *The Hollywood Reporter*, May 19, 2011, https://www.hollywoodreporter.com/news/titanic-3d-gets-release-date-189971.

[32] David S. Cohen, "Force In 3D," Daily Variety, September 29, 2010, https://varietyultimate.com/archive/issue/DV-09-29-2010-19; Dave Itzkoff, "Jar Jar Binks, Coming at You in 3-D," *The New York Times*, September 29, 2010, https://www.nytimes.com/2010/09/30/movies/30lucas.html.

[33] Carolyn Giardina, "'Top Gun' Coming to Theaters in 3D," *The Hollywood Reporter*, September 12, 2011, https://www.hollywoodreporter.com/news/top-gun-coming-theaters-3d-234032.

[34] Miller, "Titanic 3D Confirmed for 2012 Release."

adding the extra dimension after-the-fact."[35] Also in an article announcing the *Titanic* conversion, *Gizmodo*'s Kat Hannaford asks that we "don't forget all those dead bodies floating in the water that'll be popping out of cinema screens, larger than life. It'll be a 3D monstermash not seen since *My Bloody Valentine* 3D!"[36] This writer admittedly announces her distaste for the original film, describing the 1997 blockbuster as "James Cameron's career acme."[37] However, the sarcastic comments likening the film to the natively shot *My Bloody Valentine* suggest a connection between 3D and spectacle that is more akin to the denigrated bloodshed of horror than a film based loosely on an actual historical tragedy.

Unsurprisingly, film pundits and moviegoers greeted news of 3D *Star Wars* conversions with skepticism. As mentioned in the previous section, *Star Wars* fans have criticized the films' various rereleases for their excessive revisions. Fox's (and now Disney's) desire to further monetize the series is not surprising. It is one of the most successful and beloved cinematic sagas, one with seemingly infinite possibilities for merchandising and other ancillary markets. Combined with George Lucas's perfectionism and desire to improve his films on a technical level, the rerelease impulse seems logical.[38] Initial reaction to the news of the 3D conversions was skeptical, characterizing the decision as financially but not artistically motivated. *The New York Times* story about the conversion quotes a commenter named J.J. Olsen: "The only thing this 3-D conversion will add is dollars to Lucas and the studios. Talk about beating a dead

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[35] Miller, "Titanic 3D Confirmed for 2012 Release." Perhaps most amusingly, Miller prophetically warns, "old movies can't even hide under the cover of the past. Watch out *Wizard of Oz*."

[36] Kat Hannaford, "Titanic 3D Release Confirmed By James Cameron For 100th Anniversary," *Gizmodo*, March 15, 2010, https://gizmodo.com/5493695/titanic-3d-release-confirmed-by-james-cameron-for-100th-anniversary.

[37] Hannaford, "Titanic 3D Release Confirmed By James Cameron For 100th Anniversary."

[38] Julie A. Turnock, *Plastic Reality: Special Effects, Technology, and the Emergence of 1970s Blockbuster Aesthetics* (New York: Columbia University Press, 2015), 177.

horse." A commenter on a *Times* blog post is quoted: "Today, *Star Wars*. Tomorrow, *Citizen Kane*. If you liked colorization, you'll love this."[39] The reference to Orson Welles's film, popularly understood by many as the "Greatest Movie of All Time," underlines what some see as the cultural stakes for rereleasing a film in 3D. As evident with a film like *Star Wars*, the debate about the cultural capital of rereleases is far from new, but 2D-to-3D conversion represents a particular example of parallel text production that requires filmmakers to justify their work in creative terms. The following section looks at how the conversions around the various rereleases has attempted to position these films as, at once, faithful to the original 2D films and unique cinematic experiences in their own right.

To this end, the discourse surrounding the 2012 conversion of James Cameron's *Titanic* focused on how the rerelease might be positioned as an act of preservation.[40] Because some might see the very act of releasing a film in a modified form as inherently perverse, filmmakers rhetorically positioned the project to counter such assumptions. For example, the conversation ahead of the 3D conversion's release emphasized that the original film itself would be restored and remastered. According to *fx guide*, "the goal was create a new, cleaner version of the film in all formats – including 3D and 35m." It is additionally noted that this restoration itself took approximately 10 weeks to finish.[41] Thus, even if skeptics might see the conversion of the original film as a desecration, this discourse about a restoration of the film at first implies the opposite, an attempt to resurrect and resuscitate the film. Audiences can hear this news and see

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[39] Dave Itzkoff, "Jar Jar Binks, Coming at You in 3-D," *The New York Times*, September 29, 2010, https://www.nytimes.com/2010/09/30/movies/30lucas.html.

[40] For an interview excerpt about 3D conversion with *Titanic* producer Jon Landau, see Celine Tricart, *3D Filmmaking: Techniques and Best Practices for Stereoscopic Filmmakers* (New York: Routledge, 2017), 86.

[41] Mike Seymour, "Art of Stereo Conversion: 2D to 3D – 2012," *fx guide*, May 8, 2012, https://www.fxguide.com/featured/art-of-stereo-conversion-2d-to-3d-2012/.

the rerelease as respectful of this beloved contemporary classic.

In addition to touting the restoration project, the press around *Titanic* 3D could assuage anxieties about the perversion of authorial intent by highlighting original director James Cameron's involvement in the conversion process.[42] To this end, Stereo D president William Sherak pronounced film a "director's medium" and insisted that director Cameron was a "good captain" because "he knows exactly what he wants and how to tell everyone."[43] Even in the context of a post-production process largely enacted by 3D conversion vendors, the idea of an auteur remains invaluable to legitimizing a project. Similarly, a *CreativeCOW.net* report notes that for the 2013 3D conversion of *Jurassic Park*, director Steven Spielberg and his team "interacted with Stereo D on a weekly basis."[44] In a sense, the comforting notion of Cameron or Spielberg guiding the conversion process for their own classic titles allows audiences otherwise skeptical of the technology to appreciate the apparent artistic vision behind the work.

In particular, Cameron aided the conversion process with his knowledge of the mise en scene before the camera, as he was obviously present for the original filming. Producer Jon Landau told *Variety*, "Where was that glass? Where was that lightbulb? Where was this? That's all critical." On this same note, Cameron emphasized, "I can tell you exactly how far apart those

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[42] Derek Johnson writes about the complex interaction between content owner and third party with regard to licensed content, a possible parallel to the relationship between a film director and a 3D conversion company. However, it is important to emphasize that while Johnson largely focuses on what Jonathan Gray would refer to as paratexts, I am concerned here with parallel texts that can stand in for the "originals." Derek Johnson, *Media Franchising: Creative License and Collaboration in the Culture Industries* (New York: New York University, 2013); Jonathan Gray, *Show Sold Separately: Promos, Spoilers, and Other Media Paratexts* (New York: New York University Press, 2010).

[43] Seymour, "Art of Stereo Conversion: 2D to 3D – 2012," *fx guide*.

[44] Debra Kaufman, "Jurassic Park 3D: A New Dimension For A Modern Classic," *CreativeCOW.net*, April 8, 2013, https://library.creativecow.net/article.php?author_folder=kaufman_debra&article_folder=Jurassic-Park-3D-Conversion&page=1.

columns are."[45] By referring to the process of going back and remembering how everything was arranged on the day of production, the 2D-to-3D conversion can be spun as an act of preservation, with additional depth cues not defiling the original image but rather reviving the original process. By doing so, Cameron and company strategically shift the status of primary text from the original 1997 film to the original vision in Cameron's head for the 1997 film.

The project of legitimization for *Titanic* 3D is not simply limited to the involvement of *a* director. It is also significant who precisely that director is. Chuck Tryon refers to James Cameron as a "technological auteur, someone who is deeply committed to producing innovative entertainment not only through effective cinematic storytelling but also through the creation of technologies that can be used by other filmmakers."[46] Barbara Klinger also suggests Cameron's association with technological progress, noting how the "capstone" special feature for the DVD of his *Terminator 2* (1991) is the content related to visual effects.[47] As both the original director of the 1997 *Titanic* and as a filmmaker with a superlative reputation in the field of special effects, Cameron is uniquely equipped to both think through his original vision for the film *and* effectively create and implement the tech to make that vision a reality.[48]

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[45] Todd Kushigemachi, "Top deck on 3D," *Variety*, April 4, 2012, http://variety.com/2012/digital/features/top-deck-on-3d-1118052267/.

[46] Chuck Tryon, *On-Demand Culture: Digital Delivery and the Future of Movies* (New Brunswick: Rutgers University Press, 2013), 81-82.

[47] I would like to note that Stereo D also converted *Terminator 2* into 3D for theatrical release in 2013. Klinger, *Beyond the Multiplex*, 69-70.

[48] Notably, James Cameron has very publicly criticized other applications of 3D conversion. In July 2013, more than a year after the release of *Titanic* in 3D, Cameron named specific 3D conversions that did not make sense to him: "*Man of Steel*, *Iron Man 3* and all those movies should not necessarily be in 3D. If you spend $150 million on visual effects, the film is already going to be spectacular, perfect." Thus, one might argue that Cameron's defense of *Titanic* 3D represents either A) the thoughtful conclusions of a non-conversion partisan who will not rubber stamp just anything, or B) hypocritical self-contradiction in his own self-interest. "James Cameron Says 'Man of Steel,' 'Iron Man 3' Didn't Need to Be in 3D," *The Hollywood Reporter*, July 8, 2013, https://www.hollywoodreporter.com/behind-screen/james-cameron-says-man-steel-581707.

Like Cameron on *Titanic*, Steven Spielberg offered a level of legitimacy to the 3D conversion of *Jurassic Park* as the director of the original 1993 film *and* as a technological perfectionist. A *USA Today* report about the conversion includes a section entitled "Spielberg convinced," explaining the director's involvement with the conversion project.[49] The feature mentions that Spielberg was "hands-on for the nine-month process taking place before and after he shot *Lincoln* in 2011."[50] The use of "hands-on" connotes tactility and describes an intimate relationship between the artist and the reworking of his work. The mention of *Lincoln*, an Oscar-winning feature for which Spielberg received his seventh directing nomination, puts his involvement with the *Jurassic Park* conversion in the context of an active filmmaker's oeuvre. The *USA Today* feature specifically mentions that Spielberg was "especially impressed with the scene where the jeep falls down a tree away from a T. rex, which now features the image of splinters headed toward viewers' eyes."[51] As impressive as this work might have been, this article makes no mention of Stereo D, the company that actually converted *Jurassic Park* into 3D. Spielberg is a household name, so particularly in a newspaper designed for a mass audience, his approval is more important than the company whose work he is approving. Indeed, this strategy underlines the downside of underlining directorial involvement to legitimate a 3D conversion, as such emphasize can also effectively sublimate and, in this case, erase the work of Stereo D.

As valuable as Cameron and Spielberg might have been to the production and press of these 3D conversions, the active participation of an original 2D film's director is not always

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[49] Bryan Alexander, "20 years later, 'Jurassic Park' reopens in 3-D," *USA Today*, April 3, 2013, https://www.usatoday.com/story/life/movies/2013/04/03/jurassic-park-3d/1996081/.

[50] Alexander, "20 years later, 'Jurassic Park' reopens in 3-D."

[51] Alexander, "20 years later, 'Jurassic Park' reopens in 3-D."

possible, as was the case with the conversion of *The Wizard of Oz*. Despite a 74-year gap between 2D production and 3D conversion, all but ensuring that key creative personnel were no longer alive, the discourses around the conversion still emphasized how the creative process sought to preserve and to recover the past. A *Variety* article detailing the conversion process for *The Wizard of Oz* emphasizes that Warner Bros. began by going to the original 3-strip Technicolor negatives, notable because "there had never been a digital restoration that used the original negatives."[52] Even if director Victor Fleming may have died in 1949, the practitioners can highlight how they used archival materials and new technologies to recover how the film was originally designed to look.

The industry professionals involved with the 3D conversion of *The Wizard of Oz* emphasized that their work respects the original text and does not overuse the third dimension. Prime Focus's Chris Del Conte expressed how "everybody was a little apprehensive about the idea of putting our hands on such a classic film."[53] By disclosing their initial hesitation, the practitioners show that they approach the classic with a textual reverence that critics might not expect from those converting a film into 3D. Similarly, Ned Price, Warner Brothers's chief preservation officer overseeing the conversion, explained, "You've got executives who typically say 'Give me 3D. I want more 3D, I want more 3D.' And then it wasn't right for the feature."[54] On one hand, this quote suggests that 3D skeptics are right to criticize studio executives who want to convert films into 3D for 3D's sake. On the other hand, Price's comments exemplify how those working on these 3D conversions might push back against executives for the sake of

[52] David S. Cohen, "'The Wizard of Oz' Imax 3D Conversion: Polishing a National Treasure," *Variety*, September 19, 2013, http://variety.com/2013/digital/news/the-wizard-of-oz-imax-3d-conversion-1200610859/.

[53] Bryant Frazer, "Converting The Wizard of Oz to 3D," *StudioDaily*, September 11, 2013, http://www.studiodaily.com/2013/09/converting-the-wizard-of-oz-to-3d/.

[54] Cohen, "'The Wizard of Oz' Imax 3D Conversion."

whatever is best for the conversion. This is certainly not unique to 3D; indeed, the artist's struggle against "The System" is a common trope within discourses about production. What is fascinating here is how such a trope is appropriated here to defend a parallel text as a balance of commerce and art, just like any other commercial film.

Balancing the various considerations and stakes of converting a classic into 3D, industry professionals discuss their work as a negotiation of recreating the original material space, on one hand, and making changes based on creative instincts, on the other. Warner's Price researched details of the actual stages for *The Wizard of Oz*, and according to *StudioDaily*, "in general, the 3D team would defer to that reality rather than transforming the environment."[55] This echoes James Cameron's comment about knowing how far apart the columns were during original filming of *Titanic*, with the expert here not an original filmmaker but a preservationist with historical knowledge. However, as much as such historical rigor may appeal to preservationist instincts, the physical reality of the film set may have limited significance for parallel texts. Writing on colorization, Jason Gendler notes the tensions between the historical research and the creative needs of the colorized film. American Film Technologies "researched the original wardrobe colors to inform its work" on the colorization of *Casablanca*, but critics have pointed out that this may not have been the best approach, as "the original wardrobe colors really have no bearing on what the film would have looked like had it been shot in color."[56] This example suggests that the physical reality of the original shooting only provides guidance to an extent. Indeed, as useful as actual measurements might be for 3D conversion, Hollywood film sets

[55] Frazer, "Converting The Wizard of Oz to 3D."

[56] Jason Gendler, "Are My Eyes Really Brown? The Aesthetics of Colorization in *Casablanca*" in *Color and the Moving Image: History, Theory, Aesthetics, Archive*, ed. Simon Brown, Sarah Street, and Liz Watkins (New York: Routledge, 2012), 207.

contain many unrealistically proportioned elements, ultimately designed for a monocular camera to capture what the filmmakers want people to see through cues such as forced perspective. Gendler's work on colorization suggests the potential contradictions at play in the discourses surrounding the production of parallel texts.

Thus, although the physical details of the original set provide a spatial starting point and a means of discursive legitimation, Prime Focus workers will also discuss the 3D conversion deviates from the exact dimensions for creative purposes. As the *StudioDaily* article puts it, "once the team felt they had locked down the correct natural depth for all of the scenes in the film, it gave them the confidence to start using 3D a bit more aggressively." Prime Focus's Justin Jones specifically points to the Wicked Witch of the West, exaggerating the depth of her facial features to "make the witch more uncomfortable to viewers." Jones is sure to clarify though that this manipulation of stereo space is subtle. They are "respecting the material" and "not trying to make a ride film."[57] As they detail the process of converting *The Wizard of Oz*, the practitioners continually balance exegetic study and creative agency. The dismissive reference to a "ride film" harkens back to Tom Gunning's notion of a "cinema of attractions," a mode of presentation not about narrative but about relaying a series of spectacles to the audience.[58] Jones and Prime Focus want to disassociate themselves from theme parks and instead ally themselves with historians and artists.

The reference to the Wicked Witch emphasizes that 2D-to-3D conversion requires what I call creative interpretation. That is, these practitioners engage in thematic and formal analysis of the 2D film, and then, they convert the text in a manner consistent with their observations and

[57] Frazer, "Converting The Wizard of Oz to 3D."

[58] Tom Gunning, "The Cinema of Attraction[s]: Early Film, Its Spectator and the Avant-Garde," in *The Cinema of Attractions Reloaded*, ed. Wanda Strauven (Amsterdam: Amsterdam University Press, 2006), 381-388.

interpretations. Prime Focus looks at particular character or element such as the Wicked Witch's nose through a critical lens and apply the tools of 3D conversion to enhance the effect for the audience. John Thornton Caldwell has argued how "theoretical competence" functions as "a factor in the making of contemporary movies," and indeed, such skills are certainly needed for 2D-to-3D conversion.[59] As *StudioDaily* notes, the first step for Prime Focus would be a "a complete, shot by shot analysis of the film," requiring the workers to "[isolate] every object in every shot in every sequence in the film."[60] This arguably surpasses the textual scrutiny of a formalist film scholar such as David Bordwell. Like Bordwell, these filmmakers also contextualize their film analyses with macro conclusions concerning the differences between classical versus contemporary aesthetics.[61] Both Del Conte and Jones reference the longer shot lengths and the fewer edits in a film such as *The Wizard of Oz*. Del Conte details that "a 100-minute movie today is between 800 and 2,200 shots … Wizard was just about 650," and thus, the older film represents unique challenges with regard to workflow. On a similar note, Jones mentions that the longer shot length presents a creative problem, "because viewers have more time to let their eyes go around the frame."[62] Although Jones may or may not have read Andre Bazin's work on long takes, these quotes together suggest how these practitioners approach the

[59] John Thornton Caldwell, *Production Culture: Industrial Reflexivity and Critical Practice in Film and Television* (Durham and London: Duke University Press, 2008), 15.

[60] Frazer, "Converting The Wizard of Oz to 3D."

[61] David Bordwell, *The Way Hollywood Tells It: Story and Style in Modern Movies* (Berkeley and Los Angeles: University of California Press, 2006).

[62] Frazer, "Converting The Wizard of Oz to 3D."

nitty gritty details of their original text with a wide range of practical, technical, theoretical, and aesthetic considerations.[63]

In addition to making creative decisions about how much depth to add for each element, 3D conversion companies can add atmospheric effects to make the films more immersive.[64] Aaron Parry, executive vice president and chief creative officer of Stereo D, mentions that while they are largely extrapolating visual information from what is in the frame, for *Jurassic Park*, they would "add additional layers of rain or fog or smoke in stereo so it truly created a fully immersive experience."[65] As noted in Chapter 1, the cultural conversation about contemporary 3D has increasingly focused on its immersive potential. Here, again, we see the creative prerogatives associated with 3D existing in tension with a doctrine of strict fidelity to the original text. Studios do not always grant conversion companies the freedom to add extra effects, but such additions still exemplify how 3D companies generally balance fidelity and newness within the parameters of their particular project to create a 3D conversion that is and is not the same as its 2D counterpart.

Regardless of the specific technical and creative decision a 3D conversion company may make, the rereleased classic will boast the cultural legitimacy associated with exhibition in a movie theater. Above, I have made several references to the parallels between 3D conversion and

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[63] For an example of Bazin's theories concerning the relationship between depth of staging and editing, see André Bazin, "The Evolution of the Language of Cinema" in *What Is Cinema? Volume I*, trans. Hugh Gray (Berkeley: University of California Press, 1967), 23-40.

[64] While stereoscopic cinema might contribute a new level of immersive potential for atmospheric effects, "atmospheric perspective" is one of many long-standing artistic concepts regarding how to convey depth without binocular cues. As Blain Brown explains it, atmospheric perspective "was coined by Leonardo da Vinci, who used it in his paintings. Objects that are a great distance away will have less detail, less saturated colors, and generally be less defined than those that are closer. This is a result of the image being filtered through more atmosphere." Blain Brown, *Cinematography: Theory and Practice*, third edition (London, Routledge: 2016), 20.

[65] Kaufman, "Jurassic Park 3D: A New Dimension For A Modern Classic."

colorization, and while they bear many similarities, they differ in terms of their distribution and exhibition. While colorized films were designed for home video release and television broadcast, the 3D conversions of classic titles played first in movie theaters, which have a privileged reputation among traditionalist cinephiles as the "real" site of the cinema. Beyond this, specific 3D conversions have had prominent screenings at special cultural spaces that connote distinction and achievement. The film Academy screened the 3D version of *Jurassic Park* as part of a Visual Effects Game-Changers series, suggesting that this new version of the 1993 hit is worthy of the institution that has anointed itself as the arbiter of Hollywood excellence.[66] Perhaps the most extreme example of such presentation was the Cannes Film Festival's 2013 screening of Prime Focus's conversion for *The Last Emperor* (ver.), the Bernardo Bertolucci-directed Best Picture winner originally released in 1987. In an interview at the Cannes festival, Bertolucci approved of 3D conversion's possibilities using an interesting choice of words: "I love contamination. I love every time you can give life to something."[67] By using of the word "contamination," Bertolucci seems to reframe the apparent perversion of the text as an artistic disruption opening up new possibilities for the text. To make this assertion against the backdrop of international cinema's most legitimated showcase is to reposition 3D conversion as transformative art.

If 3D conversion professionals employed these various discourses to address possible concerns, how did critics actually respond? Leading 3D skeptic Roger Ebert gave the *Titanic* re-release four stars, but this is no thanks to the additional 3D. Indeed, no amount of rhetorical spin will convince Ebert otherwise: "No matter how long Cameron took to do it, no matter how much

[66] Alexander, "20 years later, 'Jurassic Park' reopens in 3-D."

[67] celluloidVideo, "Bernardo Bertolucci Cannes 2013 The Last Emperor 3D Interview," YouTube video, 3:08, May 24, 2013, https://www.youtube.com/watch?v=CtxncI7zMAg.

he spent, this is retrofitted 2D [sic]. Case closed."[68] In a much more positive assessment of *Titanic*'s 3D, *The Telegraph*'s Robbie Collin goes into greater detail about what the additional dimension adds to the story. When we see the ship in ruins, "a third dimension makes the silty lifelessness of the ship that bit more tangible," and when we move back in time, "the riot of background detail and foreground drama feels richer and more vibrant than ever."[69] The contrast between these two assessments illustrates the incongruity of arguments being made for and against 3D conversion. Those critical of conversion dismiss the technology wholesale on the level of principle, but those in favor or simply more open-minded will discuss *how* it works, just as they would with cinematography, editing, or sound.

Some reviews of the 3D rereleases explicitly addressed potential skeptics in their reviews. Reviewing *The Wizard of Oz* in 3D, Lou Lumenick directly addresses his "fellow classic film fans – some of whom greeted the very idea of this with skepticism if not downright derision," telling them that they "can relax."[70] This is because the 3D "moderately enhances the enjoyment of a film that was already about as entertaining as they come," and the 3D effects are "both subtle and respectfully applied."[71] The notion of "respectful" application echoes how those converting *The Wizard of Oz* discussed their approach to the original text. Further, Lumenick highlights what he sees as a fit between contemporary 3D technology and the production values of the 1939 classic: "*The Wizard of Oz* is on a very short list of classic-era films that would

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[68] Roger Ebert, *Titanic* 3D review, *RogerEbert.com*, April 3, 2012, https://www.rogerebert.com/reviews/titanic-3d-2012.

[69] Robbie Collin, "Titanic 3D, review," *The Telegraph*, April 4, 2012, https://www.telegraph.co.uk/culture/film/filmreviews/9185820/Titanic-3D-review.html.

[70] Lou Lumenick, "First review: 'The Wizard of Oz' in 3-D," *New York Post*, September 15, 2013, https://nypost.com/2013/09/15/first-review-the-wizard-of-oz-in-3-d/.

[71] Lumenick, "First review: 'The Wizard of Oz' in 3-D."

actually lend themselves to stereoscopic conversion … given that the extra dimension is totally compatable [sic] with its musical fantasy and outsized sets."[72] Again, Lumenick positions himself not as a 3D partisan but as a discerning critic, one who only thinks there is a "very short list" of classics that would benefit from such a conversion. Further, he characterizes *The Wizard of Oz* not simply as some untouchable classic but also as a historical example of Hollywood spectacle, perhaps akin to contemporary 3D blockbusters.

Lumenick even evokes the language of original authorial intent, even if only speculatively. As discussed above, David N. James analyzes how critics have attack the colorization of black-and-white film on the grounds that these modified versions do not represent how the creators intended the work to be seen.[73] Lumenick dwells in the realm of the fantastically hypothetical to consider such a possible criticism against *The Wizard of Oz* in 3D, suggesting that "if I could convene a séance, I'd guess that this presentation of *The Wizard of Oz* would get a big thumbs up in the sky" from the original film's director, cinematographers, producers, production designers, special effects, and actors.[74] If some might feel a 2D-to-3D conversion might disrespect the dead, Lumenick seems to think that the dead would respect the conversion. Further, James's scholarly article addresses how colorization of films does not replace the original films so long as the originals still exist. Along these lines, *Wizard of Oz* reviewer Lumenick acknowledges that the 2D original "isn't going to disappear as long as Warner Bros. can continue minting money from it," and in fact, "the 2009 restoration in 2-D is even included in some versions of the Blu-ray release, due out on Oct. 1 from Warner Home

[72] Lumenick, "First review: 'The Wizard of Oz' in 3-D."

[73] James, "On Colorizing Films."

[74] Lumenick, "First review: 'The Wizard of Oz' in 3-D."

Video."[75] In other words, if the 2D and 3D conversion can exist alongside each other, and the 3D conversion is clearly labeled, skeptics need not worry that a classic treasure will be lost.

This section has focused on how the anxieties around parallel texts have specifically manifested themselves in the reception of 3D rereleases and, more importantly, how 3D conversion professionals have anticipated and countered such possible concerns. Throughout, however, I have suggested the apparent contradictions in some of these discourses, with the simultaneous restoration and revision of 2D films. Further, as much as practitioners can seek to frame the conversation around their 3D conversions, film audiences are left to make their own evaluations of the films themselves. To this end, the rest of this chapter will employ the tools of close reading to examine the textual contradictions embedded in parallel texts and consider possible implications for how viewers will interpret new versions of old films.

Top Gun in 2D, *Top Gun* in 3D, and Parallel Textuality

The remainder of this chapter will focus on comparatively analyzing *Top Gun* (1986) and *Top Gun* 3D (2013), two parallel texts that exist in concert and in tension with each other. Such an analysis allows one to see the way in which the 3D conversion builds on the formal properties of the original 2D footage but ultimately exists on its own terms, capable of both amplifying and destroying meanings one might find in the 1986 film. I start by noting how other scholars have analyzed parallel texts. I draw on their methods for my own close reading, which considers how the parallel texts themselves embody the tension between the director's and the 3D conversion company's claims to authorship. Ultimately, I use textual analysis not only to understand the formal properties of the different versions but also to shed light on possible aesthetic and

[75] Lumenick, "First review: 'The Wizard of Oz' in 3-D."

interpretive questions for the 3D conversion companies. Arguing for a "sociology of adaptation," Simone Murray argues that adapted texts can "illuminate the contexts of their production – a sphere in which competing ideologies are just as prevalent, albeit largely ignored by commentaries outside of the industries themselves."[76]

In a sense, this analysis deals with the sort of analysis suggested by Kristin Thompson in her work on "cinematic excess." In the essay, Thompson looks at the material and formal elements of a film that cannot be easily subsumed under the narrative structures of the film.[77] Thompson and David Bordwell have written at length about the ways in which classical narrative cinema strives for cohesion and unity, seeing all elements as part of a singular formal system.[78] Her work on excess complicates this argument by a film "can never make all the physical elements of the film part of its set of smooth perceptual cues."[79] Ultimately, what is or is not excessive can be up to the critic, such that "every stylistic element may serve at once to contribute to the narrative or to distract our perception from it."[80] This analysis of the 2D and 3D versions of *Top Gun* takes on these tensions head on, dealing with how a 3D conversion of a "classic" title has an unstable relationship to the 2D version which preceded it. Instead of rejecting an entire eye's worth of image as mere excess, I hope to understand how the work of the 2D-to-3D conversion companies creates meaning.

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[76] Simone Murray, *The Adaptation Industry: The Cultural Economy of Contemporary Literary Adaptation* (New York: Routledge, 2012), 5.

[77] Kristin Thompson, "The Concept of Cinematic Excess," in *Film Theory and Criticism*, ed. Leo Braudy and Marshall Cohen, sixth edition, (New York: Oxford University Press, 2004).

[78] David Bordwell, Janet Staiger, and Kristin Thompson, *The Classical Hollywood Cinema: Film Style & Mode of Production to 1960* (New York: Columbia University Press, 1985).

[79] Thompson, "The Concept of Cinematic Excess," 513-514.

[80] Thompson, "The Concept of Cinematic Excess," 516.

This comparative analysis of *Top Gun* 2D and 3D builds on previous scholarship that has analyzed parallel texts. Janet Bergstorm has explored the various versions of F.W. Murnau's *Sunrise*, including the Movietone synced sound version and the silent version with live music.[81] The most extensive analysis of a specific parallel text in the context of film on television is John Thornton Caldwell's work on a television broadcast of Oliver Stone's *Salvador* (1986).[82] Caldwell acknowledges that many film fans might "assume that the broadcast of a film is, by nature, reductive," given TV's censorship and deletion of scenes for time.[83] However, he suggests that the process is actually "hybridizing" and "additive," that "even subtractive operations … create new structures and relationships within adapted texts."[84] Caldwell examines the larger text of the film's broadcast, including the advertisements, framings, and juxtaposed news reports. The KCOP broadcast notably censored one scene for the broadcast but then used a still from this deleted material as a freeze frame to promote the film.[85] The station also resynced audio and picture such that an image is "redefined in an explicitly psychological, rather than political, way."[86] Like Caldwell, I am not simply interested in recognizing that films change when they move across mediums. Rather, I want to examine how they change on a formal and thematic level, particularly when a great deal of thought goes into the parallel text, as with 2D-to-3D conversion. Close stylistic analysis of such arguably perverse parallel texts illuminates not

[81] Janet Bergstrom, "Murnau, Movietone and Mussolini," *Film History* 17, no. 2 and 3 (2007): 187-204.

[82] John Thornton Caldwell, *Televisuality: Style, Crisis, and Authority in American Television* (New Brunswick: Rutgers University Press, 1995), 114-133.

[83] Caldwell, *Televisuality*, 114.

[84] Caldwell, *Televisuality*, 114.

[85] Caldwell, *Televisuality*, 115-117.

[86] Caldwell, *Televisuality*, 121-122.

only the multiplicity of texts across their various versions but also how the conflicts between the aesthetic prerogatives of different formats require practitioners to creatively interpret texts and negotiate these tensions. Further, these professionals' work subsequently facilitates and complicates how audiences make sense of a text's transformation into something that is and is not the same.

Jason Gendler's work on the colorization of black-and-white films also represents a crucial precedent for my analysis.[87] Specifically, Gendler compares the original black-and-white *Casablanca* (1942) with its colorized counterpart. As I have discussed, colorization and 3D conversion are not only similar in that they anachronistically update library titles to fit new technological standards; they share institutional DNA, with Legend3D founder Barry Sandrew developing his proprietary conversion software from his own colorization technology. Gendler's analysis of colorization focuses on the aesthetics of the two parallel versions of *Casablanca* with regard to classical Hollywood storytelling norms, as well as a consideration of how the colorization compares to a hypothetical Technicolor *Casablanca*, the likely technical process had Warner Bros. originally shot the film in color in the 1940s.

Most importantly, Gendler focuses on the contradictions of the colorized *Casablanca*, which troubles classical narrative clarity to suit the purposes of the colorization. The article builds on the work of David Bordwell, Kristin Thompson, and Janet Staiger, who argue that classical Hollywood filmmakers first and foremost worked to facilitate viewer comprehension of essential narrative information.[88] The color added to *Casablanca* does not always function in such a manner: In one shot, the black-and-white version emphasizes the character Yvonne

[87] Gendler, "Are My Eyes Really Brown?," 199-210.

[88] Bordwell, Staiger, and Thompson, *The Classical Hollywood Cinema*.

through visual cues such as "the relative size and position of objects," but "colorization alters the salience of information in this shot, creating a visual gradient that undermines the juxtaposition of scale in the black-and-white film."[89] Specifically, "the brightly lit, green and blue hued Nazis" become more of a focal point, driving the viewer's attention away from what Gendler sees as the most important story information in the shot.[90] Thus, this article not only takes a parallel text seriously from an aesthetic perspective but also suggests the ways in which the colorized film has a design that is uniquely its own, often in a transhistorical manner that privileges the present's mandate for colorization rather than the past's emphasis on narrative causality.

Like Gendler's work, the following analysis compares two parallel texts, ones that are ostensibly interchangeable as representations of "the text" but that still have different formal qualities that create unique tensions. That said, it is important to note the different institutional and historical contexts of *Casablanca* and *Top Gun*. Warner Bros. produced *Casablanca* in the midst of the classical Hollywood era, a time in which filmmakers arguably valued narrative information above all else. However, Tony Scott made *Top Gun* in 1980s, a time in which the clarity of storytelling was still important but existed alongside a greater sense of image stylization for stylization's sake or, as Justin Wyatt argues, for increased marketability.[91] To be sure, David Bordwell would suggest that contemporary style still privileges narrative comprehension in a sort of "intensified continuity."[92] However, I am interested in exploring the

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[89] Gendler, "Are My Eyes Really Brown?," 201-202.

[90] Gendler, "Are My Eyes Really Brown?," 201.

[91] As Justin Wyatt points out, producers Don Simpson and Jerry Bruckheimer choose director Tony Scott for *Top Gun* because they were "motivated by their conception of the film in primarily visual terms." Scott's visual style in *The* Hunger (1983) and his work in television advertising indicated he was right for the job. Justin Wyatt, *High Concept: Movies and Marketing in Hollywood* (Austin: University of Texas Press, 1994), 26.

[92] Bordwell, *The Way Hollywood Tells It*.

contradictions of aesthetics that emphasize style and are often critically maligned for doing so. Indeed, such a focus suggests telling similarities and differences between the reputations of Tony Scott and of 3D conversion companies. On one hand, popular film critics attack the work of both Scott and 3D conversion companies for supposedly privileging style (or image) over substance. On the other hand, many elements of Scott's style that arguably make his films so divisive—including cinematography and editing choices that *distort* legibility and space—present unique challenges for 3D conversion companies attempting to *emphasize* space with additional depth cues.

In Chapter 1, I highlighted how 3D conversion companies carefully negotiate their claims to authorship. They subsume their work under directors' visions to draw from and further support the cultural legitimacy of singular authorship, but at the same time, they must also emphasize the creativity of 3D conversion to position their work as more than mere technological update. In a sense, my analysis of *Top Gun* examines how such tensions exist at the level of form for 3D conversions of films. By looking at ways that the 3D conversion alternately intensifies or contradicts the aesthetics and possible interpretations of *Top Gun*, we can see how 3D conversions exist as parallel texts that are and are not the same as their 2D counterparts. Parallel texts require specific forms of analysis to fully explore as cultural objects, and in turn, such comparative analysis can illuminate the creative and intellectual labor of converting the 2D films into 3D in the first place.

Ultimately, I intend my comparative reading of *Top Gun* 2D and *Top Gun* 3D to explore the implications of parallel textuality for both 3D conversion companies and for potential viewers of 3D conversions. 3D conversion as a process requires deep engagement with the form of the original 2D text. 3D conversion professionals must break down the film, shot by shot, and

determine how 3D space can best contribute to the images and to the narrative. These practitioners' analyses then pave way the way for audiences to then interpret and make sense of *Top Gun* 3D. To borrow Stuart Hall's language, 3D conversions must decode (the 2D film) before then encode (in their 3D conversion), which then results in further decoding (of the 3D version) by viewers.[93] Parallel textuality results in parallel reading processes. This section and the next will focus on different frameworks through which we can make sense of these parallel reading processes. While the following section will focus more on ideological implications, I focus here on aesthetics and authorship.

Top Gun centers on the defiant hot shot Maverick's (Tom Cruise) entry to the United States Navy's fighter weapons school in Miramar, San Diego. With the help of his co-pilot and friend Goose (Anthony Edwards), Maverick has two main goals: He wants to best rival aviator Iceman (Val Kilmer), and he wishes to woo his instructor Charlie (Kelly McGillis). A comparative analysis of *Top Gun* in 2D and 3D uncovers an aesthetic tension between stylistic choices that compress depth, such as long lenses, and stereoscopic cues designed to enhance a sense of depth. I will situate the filmmaking choices for *Top Gun*'s 2D version in the context of director Tony Scott's style, one that often emphasized the flatness and mediation of the filmic image. I use such an auteur-driven analysist not because I believe such a framework to be the best way to understand *Top Gun* or any film. Rather, I am interested in the intersection of 3D aesthetics with popular frameworks for making sense of movies. Film critics had evaluated *Top Gun* in the context of Tony Scott's oeuvre before the 3D conversion's release, and thus, I explore how a parallel text such as a 3D conversion, one with its own unique formal properties, complicates such a conception of authorship.

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[93] Stuart Hall, "Encoding/decoding," in *Culture, Media, Language*, ed. Stuart Hall, Dorothy Hobson, Andrew Lowe, and Paul Willis (London: Hutchinson, 1980), 128-137.

Further, the details concerning the 3D conversion of *Top Gun* and director Scott's role in the process exacerbate questions of authorship. Director Tony Scott died on August 18, 2012, a matter of months before the release of *Top Gun* 3D. In October, the death was officially ruled a suicide by the Los Angeles County coroner's office.[94] *Top Gun* 3D was the last release on which the director worked. Tony Scott gave Legend3D complete creative control over the conversion process, but he reviewed each of the reels as they were completed in 3D.[95] Legend3D reportedly met with Tony Scott for a final luminance check on August 9, just nine days prior to his death.[96] Writing in June, *The New York Times*'s Michael Cieply went so far as to suggest that the 3D film "might be perceived by moviegoers as a tribute to a director whose death remains a mystery to many friends and associates."[97] For these reasons, it was and still is difficult to watch *Top Gun* 3D without thinking about the larger legacy of director Tony Scott.

In the wake of Tony Scott's death, some film critics touted the artistic merits of a director who had historically been met with critical indifference and, at times, disdain. Many of these appreciations were consistent with the critical concept of the "vulgar auteur." Calum Marsh has described vulgar auteurism as a phenomenon of "unfairly maligned or under-discussed filmmakers working exclusively in a popular mode…who, despite an obvious formal command

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[94] Richard Winton and Andrew Blankstein, "Director Tony Scott had no serious medical conditions, coroner says," *Los Angeles Times*, October 22, 2012, http://latimesblogs.latimes.com/lanow/2012/10/director-tony-scott-had-no-medical-condition.html.

[95] Ian Failes, "Back into the danger zone: *Top Gun* 3D," *fx guide*, February 8, 2013, http://www.fxguide.com/featured/back-into-the-danger-zone-top-gun-3d/.

[96] Barry B. Sandrew, "Remembering Tony Scott," Innovation in Advanced Digital Imaging (blog), August 21, 2012, http://bsandrew.blogspot.ca/2012/08/remembering-tony-scott.html.

[97] Michael Cieply, "Suicide Complicates 'Top Gun' Project," *The New York Times*, November 7, 2012. http://www.nytimes.com/2012/11/07/movies/tony-scotts-suicide-complicates-top-gun-3d-project.html.

and distinctive directorial voice, are rarely discussed in a serious way."[98] Other directors cited in this context include Paul W.S. Anderson, Michael Bay, Michael Mann, and John McTiernan. In film criticism and scholarship, the concept of the auteur has often functioned to elevate the credibility of cinema as an art form. Countering the criticism that a movie was but a factory-produced commercial product, a film had the potential to be the singular vision of a director-as-artist, in the same way one might expect with a painting or a composer's symphony. Most popularly, Andrew Sarris used the concept of the author to elevate a pantheon of American directors he saw working as artists, the creative authorities over the films in their *oeuvre*.[99] His top-tier examples included John Ford, Orson Welles, and other canonical "Greats." Given this historical context, "vulgar auteurism" represents, at once, an apparent oxymoron and a redundant construct. On one hand, critics who employ a vulgar auteurist framework are using critical tools designed for legitimate cinema in the service of appraising what others see as trash. On the other hand, the auteur theory originated as an argument for the artistry of commercial works; thus, all auteurs are vulgar auteurs. Either way, I cite the concept of vulgar auteurism because film critics of this school have discussed director Tony Scott as an underappreciated artist.

Tony Scott's champions in film criticism reference how the director's various signature flourishes challenge traditional ideas about cinematic space, and indeed, they suggest this unconventional vision is precisely why many rejected his work in the first place. In an appreciation that was posted after the director's death, Ignatiy Vishnevetsky suggests that some film critics did not like how the director "never [let] an image hold long enough for the viewer to

[98] Calum Marsh, "Fast & Furious & Elegant: Justin Lin and the Vulgar Auteurs," *The Village Voice*, May 24, 2013, https://www.villagevoice.com/2013/05/24/fast-furious-elegant-justin-lin-and-the-vulgar-auteurs/.

[99] Andrew Sarris, *The American Cinema: Directors and Directions 1929-1968* (New York: E.P. Dutton & Co., Inc., 1968).

figure out just exactly what was going on."[100] He continues, Scott's images are "impressionistic to the point of abstraction, 'unreadable,' arranged in ways that don't create any sense of a space or a chronology."[101] Vishnevetsky even calls on Scott's training as a painter to suggest his aesthetic as ultimately "painterly," first an "expressionist…with Pop Art tendencies, and later an impressionist whose style was more abstract than figurative."[102] Vishnevetsky's characterization of Scott's directorial style exemplifies how film critics will approach otherwise-denigrated films using the language of art criticism, providing an alternate framework which allows for a greater appreciation of Scott's films.[103] Further, these specific quotes highlight how Scott's filmmaking presents potential challenges for 2D-to-3D conversion. In simple terms, the 3D conversion requires the isolation of different figures in a 2D image, and the valuation of their spatial relationships to each other. Thus, in addition to being a challenge for some film critics, Tony Scott's revolting and revered strategies seemed particularly problematic for mainstream understandings of 3D cinema, where figures and space are predominant tools of expression.

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[100] Ignatiy Vishnevetsky, "Smearing the Senses: Tony Scott, Action Painter," *Notebook*, August 22, 2012, https://mubi.com/notebook/posts/smearing-the-senses-tony-scott-action-painter.

[101] Vishnevetsky, "Smearing the Senses."

[102] Vishnevetsky, "Smearing the Senses."

[103] I want to underscore that "vulgar auteurism" is not the only (or even best) way to understand the aesthetics of *Top Gun*. Rather, I use this framework to demonstrate how 3D can enhance and/or complicate popular ways of understanding the movies. Indeed, Tony Scott's aesthetic can be alternately related to television, rather than painting. As John Thornton Caldwell notes, Scott was one of many directors (including his brother Ridley) who in the mid-1980s collapsed the "institutional wall between the advertising and feature-film worlds." Thus, excessive style, rejected by film critics, might be business-as-usual in television. Indeed, other filmmakers described as "vulgar auteurs," such as Michael Bay, also started their careers in televisual forms such as commercials and music videos. Thus, critical anxiety about excessive cinematic style might be, subconsciously, an anxiety about television. John Thornton Caldwell, *Televisuality: Style, Crisis, and Authority in American Television* (New Brunswick: Rutgers University Press, 1995), 10.

Auteurist film critics likely do not consider *Top Gun*, Tony Scott's second feature, a "mature" work in terms of the director's filmography and artistic signature.[104] Still, *Cinema Scope*'s Christoph Huber and Mark Peranson write about *Top Gun* as closer to Tony Scott's artistic vision than his feature debut *The Hunger* (1983), because of the Navy film's "flattened telephoto vistas, imposing red filters, sway-o-cam and slo-mo synched to Moroder-Faltermayer [keeping] the flattened, distracting stock character cutouts in check."[105] And as I will demonstrate this section, *Top Gun* features many key scenes that fracture a clear sense of space, presenting unique challenges for those tasked with converting the film into 3D.

The problems of flatness come to the fore with the very first shots of *Top Gun*. In the 2D version, long shots feature silhouetted figures surrounded by fog and compressed in space. This collapse of space seems to have been achieved with a combination of long lenses and incredibly low amounts of light. Most of the unnamed figures in these shots appear not clearly in relief but as silhouettes and only as broad outlines (fig. 5). The same can be said of the perceived relationships among different airplanes in these opening shots, which monocular cues suggest are actually staged at different distances from the camera. In one shot, under a credit reading "Produced by Don Simpson and Jerry Bruckheimer," the distance between two airplanes, one silhouetted in the foreground and another better lit in the middle ground, is compressed in such a way (fig. 6). For this opening sequence, the 3D conversion separates these figures out into separate intervals of depth in z-space. While a strict interpretation of the scene's spatial

[104] *Man on Fire* (2004) represents a much more obvious example of fragmented, chaotic action aesthetics. That film's opening credit sequence features extremely tight framings, double exposure, and variable film cranking, techniques that exaggerate celluloid's mediation but challenge viewer comprehension of cinematic space. Further, throughout *Man on Fire*, Scott makes use of reflective surfaces and selective focus. By comparison, *Top Gun* is not nearly as stylized.

[105] Christoph Huber and Mark Peranson, "World Out of Order: Tony Scott's Vertigo," *Cinema Scope*, accessed June 4, 2015, http://cinema-scope.com/cinema-scope-online/world-out-of-order-tony-scotts-vertigo/.

construction might suggest that no depth be added to the film, the creative and commercial impulse of the 3D conversion companies might alternately suggest that these elements should be separated from each other.

Even more problematic, the original film includes shots of fog in a seemingly undifferentiated mass of atmospherics. In the 3D conversion, the fog itself is artificially separated into separate entities, with each one seeming artificially flat. One of the biggest challenges with 3D conversions is to give shapes and figures in the shot a sense of fully rounded depth, as opposed to a number of flat objects separated in space. Critics universally reviled the 3D conversion for *Clash of the Titans* (2010), and much of this critique centered around this effect. *New York Times*'s Manohla Dargis suggested how the conversion "segments the image into discrete planes, bringing to mind the unintegrated levels of a pop-up book."[106] The fog in the opening sequence for *Top Gun* 3D suggests the challenge of creating this sense of depth when the sense of depth in the initial image is so purposely impressionistic. How do you dimensionalize fog when fog itself lacks clear spatial parameters?

Instead of looking at the tension between flatness and depth in *Top Gun*'s opening sequence as evidence of why this film should not have been converted, I characterize such shots as a specific aesthetic challenge for 3D conversion companies. In an interview with *fx guide*, Legend3D's Barry Sandrew notes the extensive use of long lenses in *Top Gun*, which "tend to compress space, [flattening] the subject in frame. While this can be desirable in a 2D film, for a 3D film that is shot 'natively' it can be a serious issue. However, with 2D to 3D conversion the sky is the limit. We are lens agnostic and can create depth that would otherwise be impossible

[106] Manohla Dargis, "Beware of Greeks Bearing Buzz Cuts," *The New York Times*, April 1, 2010, http://www.nytimes.com/2010/04/02/movies/02clash.html?ref=movies.

Figure 5: Spatial relationships among human bodies and planes obfuscated by fog in opening shots of *Top Gun*.

Figure 6: Planes compressed in z-space by long lens, even as monocular depth cues suggest one is closer to the camera than the other.

through conventional capture."[107] This might be the rhetorical spin of a practitioner attempting to justify his company's work, particularly compared to native 3D image capture. Critics of 3D conversion might see such a statement as proof of 3D conversion's aesthetic perversion, disrupting the "original intent" for the image. However, by considering the perspective of the

[107] Failes, "Back into the danger zone: *Top Gun* 3D."

creative laborers, we can begin to understand the breakdown of a long lens shot as a creative technical decision and as part of a different but parallel film, *Top Gun* 3D.

Long lenses and shallower depth of field are only two of the many technical and stylistic choices in traditional 2D filmmaking that potentially conflict with 3D conversion and 3D filmmaking in general. As I will discuss further below, rapid editing can undercut 3D cinematography, as viewers might require more time to register the left and right eye images and effectively fuse them together for a coherent understanding of the three-dimensional space.[108] Further, in his guide on 3D for the American Society of Cinematographers, Rob Hummel explains the difficulties of cutting from a shot with objects far behind the screen to a shot with objects coming out of the screen: "The average viewer will have difficulty converging the suddenly 'close' object, to the point where he might see double images for several moments."[109] The 3D conversion of a shot with rack focus might be unpleasant for a viewer, as humans are not accustomed to converging their eyes on an object but having that object suddenly come out of focus. These examples are far from exhaustive, and importantly, I am not suggesting that there are right or wrong ways to approach 3D filmmaking. Indeed, as disorienting or discomforting as some of the choices discussed above might be, filmmakers can intentionally use them to induce particular reactions from an audience. Regardless, I critically interrogate these tensions between 2D and 3D aesthetics because they embody the contradictions of textuality and authorial intent in parallel texts, which require 3D conversion professionals to negotiate these conflicts and can inspire viewers to do the same.

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[108] See Chapter 3 for a related discussion of shot length in contemporary stereoscopic films, including relevant quotes from DNEG's Paul Becker and Disney's Jared Sandrew.

[109] Robert C. Hummel III, "*3-D Stereoscopic Cinematography*," in *American Cinematographer Manual*, 10th Edition (The ASC Press, 2013), 201-202.

The aesthetic tension between a 3D conversion and its 2D predecessor bring a complex temporal dimension to existing theorizations of 3D. Legend3D's conversion contributes an overdetermined temporal confusion, particularly for a viewer who has already seen the film. The text is new, yet it is not. As Barbara Klinger puts it, "the ritual of return" to a film previously consumed "juxtaposes past and present (the experience of the film then and its experience now)" and thus "may introduce more volatile dynamics into the mix."[110] Roland Barthes's words on the act of rereading a text prove resonate with this sort of doubled experience, the possibility of simultaneously watching the 3D film while recalling the experience of the 2D film: "Reading is no longer consumption, but play (that play which is the return of the different). If then, a deliberate contradiction in terms, we *immediately* reread the text, it is in order to obtain, as though under the effect of a drug…not the *real* text, but a plural text: the same and new."[111] If the act of rereading is already an experience of both the same and the new, a parallel text exacerbates this tension with material and formal differences. Especially for someone who knows the film well, the viewer approaches the 3D conversion with expectations about how images might look in 3D, and they may observe how the 3D images differ from their 2D counterparts.

This temporal dimension to spectatorship adds a new layer to previous scholarly theorizations of how viewers experience and interact with 3D film texts. Miriam Ross has analyzed stereoscopic cinema in phenomenological terms.[112] Ross suggests that with the stereoscopic screen, "rather than finding distance from the screen and a sense of mastery over the

[110] Klinger, *Beyond the Multiplex*, 139.

[111] Roland Barthes, *S/Z*, trans. Richard Miller (New York: Hill and Wang, 1974), 16.

[112] Miriam Ross, *3D Cinema: Optical Illusions and Tactile Experiences* (London: Palgrave MacMillan, 2015).

images, we consider and reconfigure our bodily placement in relation to the screen content."[113] However, this is complicated by the possible temporal distance between the viewer and a text, as nostalgia or intimate familiarity might create another sort of mastery over or ownership of the text. 3D films engage our body, 3D conversions of familiar films also engage our cinematic memories. They can inspire viewers to consider how 3D was added, and how the new dimension does or does not affect their relationship to the film in a reflexive engagement with the parallel text. *Top Gun* 3D underlines how the industrial and cultural dimensions of 3D library conversions inflect our stereoscopic experiences, and it suggests that a conversion, however financially motivated the conception might be, opens up reading possibilities for viewers.

The aesthetic tension between flatness and depth has especially important implications for a reflexive engagement with *Top Gun* 3D in some of the film's key emotional and intense moments. *Top Gun* utilizes a chaotic aesthetic for a visceral effect at important points in the film, and a viewer of the movie in the present movie may see these aesthetic choices as consistent with the visual signature of Tony Scott's later work.[114] Such framing and editing choices are evident in a scene towards the beginning of the film when Maverick's wingman Cougar, suffering from a nervous breakdown in the air, struggles to regain focus and land his plane. The film uses progressively faster edits and progressively tighter framings to underline the intensity of this moment. The first POV shot from the perspective of Cougar's plane lasts approximately 2.7 seconds. The second and third of these POV shots respectively last 1.61 and 1.29 seconds. The final two POV shots as the plane lands come in under one second. Because quick cuts can

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[113] Miriam Ross, "The 3-D aesthetic: *Avatar* and hyperhaptic visuality," *Screen* 53, no. 4 (Winter 2012): 386.

[114] My use of the word "chaotic" is inspired by Matthias Stork's series of visual essays analyzing the aesthetics of contemporary action filmmaking. "Chaos Cinema Part 1," Vimeo video, 10:23, posted by matze, 22 August 2011, https://vimeo.com/28016047; "Chaos Cinema Part 2," Vimeo video, 8:09, posted by matze, 22 August 2011, https://vimeo.com/28016704; "3," Vimeo video, 14:43, posted by matze, 23 April 2012, https://vimeo.com/28016704.

undercut a viewer's spatial orientation in 3D cinema, in these scenes, it is difficult for the viewer to discern the level of depth ascribed to these images. Not an inherent problem, the "failure" of 3D in this sense potentially adds to the lack of spatial awareness experienced by Cougar.

This collapse of space during Cougar's descent is further emphasized by the use of onscreen/offscreen space and the use of various framings. For each of the five POV shots from the perspective of Cougar's plane, the landing pad starts at the edge of the frame or offscreen, only moving closer to the center of the frame as the camera swings left or right. Like the rapid editing, these framings obfuscate spatial relationships. Similarly, the frontal shots of Cougar's face move from close-ups that show his helmet and his chin, to tighter close-ups that do *not* show his helmet and chin, and finally to extreme close-ups that only show his eyes (fig. 7). All of these techniques work together in concert to convey a collapse of spatial orientation. This brings us back to the words of Vishnevetsky, who suggests Scott can be "impressionistic to the point of abstraction, 'unreadable,' arranged in ways that don't create any sense of a space of chronology."[115] For *Top Gun* and *Top Gun* 3D, these moments of spatial confusion might be relatively contained to specific moments in the narrative, yet they still exist as aesthetic challenges for 3D conversion. That is, the aesthetics of *Top Gun* arguably undercut or minimize the addition of stereoscopic depth cues in this scene.

[115] Vishnevetsky, "Smearing the Senses."

Figure 7: Cougar must land a plane during his nervous breakdown, emphasized formally though progressively tighter framings.

In an article corresponding with the 3D rerelease, Legend3D's Barry Sandrew discussed how the 3D conversion company approached a specific instance of such visual fragmentation. Sandrew says that, for the flat spin scene just prior to the death of the character Goose, Legend3D modulated the 3D accordingly to match both the aesthetic and emotional elements of this scene. If the depth cues during Cougar's descent were difficult to make out, any sense of stereoscopic depth is barely palpable in Goose's final moments. The image is already unstable with the shaky movement of the camera. The tight framings of the spinning plane, Maverick's face, and the controls of the plane make this movement all the more confusing. It is all but impossible to discern any stereoscopic depth at this moment. Given the challenges presented by such a scene, Legend3D would have clear visual reasons for dialing down the level of parallax. But explaining why they dialed down the stereoscopic depth, Legend3D's Barry Sandrew instead emphasizes narrative reasons. According to Sandrew, the filmmakers tamed the immersion effect and instead "eased into an observation standpoint so as not to distract from the impact of this

important moment in the story."[116] While some critics might reject such an explanation as clever spin, this quote demonstrates the creative interpretative engagement required in negotiating aesthetic challenges of flatness for *Top Gun* in 3D. In short, Sandrew's comments underlines the necessity of textual analysis as production practice for 3D conversion companies.

These instances of dimensionalizing the depthless once again points to the double bind of film technologies. As discussed in Chapter 1, emerging media technologies such as 3D or color often find themselves need to be both noticeable enough to be worth the investment for consumers, but they cannot be too obvious as to depart from industrial and aesthetic norms.[117] This challenge is incredibly relevant for digital 3D cinema. Contemporary digital 3D created potential costs for a number of stakeholders, whether that be the studios accounting for effects on production, exhibitors early on weighing the switch to digital projection, or viewers wondering whether a 3D version was worth a surcharge. When these questions about costs and benefits relate to a converted library title such as *Top Gun*, which was not originally intended for a 3D release, these problems become only magnified. Simply put, if the 3D conversion company pulls back on the 3D in scenes such as the flat spin scene, is it worth, as *The Simpsons* crudely put it, "See[ing] What You Saw Before, Except It Costs More?"

Despite these histories of media industries struggling to strike the balance between noticed and natural with new technologies, the normalization of features such as color, sound, and widescreen would pave the way for filmmakers to employ these various tools in more muted ways, sometimes abandoning them completely. Once seen as "upgrades" to a system of production that worked, technologies such as color, sound, and widescreen would eventually

[116] Failes, "Back into the danger zone: *Top Gun* 3D."

[117] See Susan Murray, *Bright Signals: A History of Color Television* (Durham: Duke University Press, 2018).

become standardized practice. As Susan Murray notes in the case of color, a medium's use of color might have been initially characterized as adding something special, but "once color became the norm in film, photography or in television … it lost much of [its] sensual intensity and metaphorical power."[118] Going a step further, many of these techniques would reach a point in which the very absence of the technology could be an effective storytelling tool. Sound films routinely use silence. Color films occasionally use sequences of black and white, and vice versa, often for symbolic purposes.[119] However, perhaps because stereoscopic versions remain tied to a monetary surcharge, 3D cinema with extended periods of nearly 2D sequences might be considered a waste of money.

Top Gun's instances of relative flatness suggest that the application of 3D in conversion might be better understood in terms of a spectrum representing varying levels of depth, rather than as a binary of 3D or no 3D. A central goal of this study is to better understand the perspective of 2D-to-3D conversion companies. For the 3D conversion professional, the question of whether a film should or should not be converted into 3D is irrelevant. They are working on a creative project for a client, and they choose the best solutions to the challenges associated with the 2D footage which they must convert. This mandate might mean adding as much depth as possible in some instances and scaling back in others. The amount of 3D depth can be modulated within and across shots, similar to how filmmakers can shift focal length for artistic purposes. Miriam Ross notes that 3D films "will have parts where the stereoscopic effect is reduced to the

[118] Murray, *Bright Signals*, 182.

[119] Films such as *Cléo from 5 to 7* (1962), *She's Gotta Have It* (1986), *Wings of Desire* (1987), *American History X* (1998), and *Memento* (2000) feature scenes in both color and black-and-white. However, perhaps the best-known example of such a hybrid is *The Wizard of Oz* (1939), with sepia tone signifying the shift from Dorothy's life in Kansas to the magical Technicolor of Oz. This transition is echoed in the 3D movie *Oz the Great and Powerful* (2013), in which the protagonist's trip to Oz is accompanied with much deeper stereoscopic cues.

two-dimensional and there is the opportunity to read the content as a coherent statement."[120] As the scenes of Cougar's descent and Goose's death in *Top Gun* suggest, these moments of relative flat images can also effectively function as incoherent statements, ones that contribute to the emotional arc of the film.

Missiles and Muscles: Interpretative and Ideological Implications of *Top Gun* 3D

I admit that the aesthetic analysis of *Top Gun* above might not be readily available for many of the viewers watching the 3D conversion. Still, I find it important to theorize a viewer's negotiation of 2D and 3D aesthetics as a possible and specific viewing experience, one that itself parallels the 3D conversion professionals' own process of creative interpretation. I also acknowledge the possible limitations of textual analysis that focuses primarily on film style. Indeed, cinema and media studies scholars have long-debated whether film form is a system that is somehow separate from ideology or, rather, the very embodiment of ideology.[121] For their part, Jean-Louis Comolli and Jean Narboni argued that "because every film is part of the economic system it is also part of the ideological system, for 'cinema' and 'art' are branches of ideology."[122] To this end, I expand on my discussion of aesthetics to consider how the formal synergies and tensions between the two parallel texts potentially impact possible meanings of the film(s). This section explores possible ideological implications of 3D conversion by examining

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[120] Ross, "The 3-D aesthetic: *Avatar* and hyperhaptic visuality," 386.

[121] Jean-Louis Comolli and Jean Narboni, "Cinema/Ideology/Criticism," in *Cahiers du Cinema 3, 1969-1972: The Politics of Representation*, ed. Nick Browne (London: Routledge, 1990), 58-67; Clyde Taylor, "The Re-Birth of the Aesthetic in Cinema," in *The Birth of Whiteness: Race and the Emergence of U.S. Cinema*, ed. Daniel Bernardi (New Brunswick: Rutgers University Press, 1996), 15-37.

[122] David Bordwell has criticized Comolli's work explaining the history of cinematic depth in ideological terms: "When he offers conclusions, his generalizations tend to be sweeping … Comolli's concept of ideology is correspondingly vague." Comolli and Narboni, "Cinema/Ideology/Criticism," 60; David Bordwell, *The History of Film Style* (Cambridge: Harvard University Press, 1997), 161.

how the 2D and 3D versions of *Top Gun* compare with regard to a "dominant" reading of the film's militarism, as well as a possible counter reading of the film's queer subtext.[123] In addition to recognizing the ideological dimensions of film form, these approaches arguably represent more accessible frameworks for understanding movies, as many viewers might be more concerned not with films' style but with their thematic implications. As with my ahistorical auteurist analysis of Tony Scott, I do not use these frameworks because they necessarily represent the best or only ways to understand *Top Gun*. Rather, I use these various frameworks to illustrate the complex relationship between 2D and 3D versions of the same film, with careful attention to how stereoscopic depth cues can intensify or complicate preexisting interpretations of a film one has already seen.

Despite the challenges of a flat, chaotic visual style in specific scenes, the original *Top Gun* also presents a number of scenes that arguably lend themselves to 3D conversion, often with problematic thematic implications. Specifically, *Top Gun* glamorizes and fetishizes Naval Air service and, by extension, American military power, and the 3D conversion exacerbates such ideological implications in the film's aerial sequences.[124] The converted aerial scenes make for some of the most stunning visuals in *Top Gun* 3D, as the 3D enhances a clear sense of space in a manner organic to the film's setting. However, the additional dimension also further encourages a sense of identification with the United States Navy, in a narrative that largely ignores the reality of war. Thus, while the previous section focused on the aesthetic tension between the 2D

[123] Hall, "Encoding/decoding."

[124] Describing young audiences' canonization of blockbusters such as *Raiders of the Lost Ark* (1981) and *Top Gun* (1986), Barbara Klinger addresses the possibly regressive nature of film re-viewing, how "the repeated nostalgic return to 1980s films masks their ideological operations and relationship to a conservative political era." Klinger, *Beyond the Multiplex*, 178.

style and 3D conversion, I now focus on how 2D style and 3D conversion can work together, and how parallel textual has implications for how we interpret movies.

Just as the time between *Top Gun*'s original 2D release in 1986 and its 3D conversion in 2013 offers viewers the ahistorical context of Tony Scott's biography and filmography, the dual temporality of the parallel texts presents opportunities for renewed interpretations influenced by shifting political attitudes about war and the American military, as well as emerging outlets for the consumption of war images. John Thornton Caldwell describes how cable news covered the Gulf War of 1990 to 1991: "Endless replays of low-resolution, grainy, and chaotic footage filled the airwaves and cable systems for weeks. Gun-mounted camera footage on supersonic fighter bombers was replayed to an international audience, even though viewers could seldom see anything other than sighting devices and calibration marks."[125] More recently, YouTube and other digital platforms have offered new interpretive frames for war that exist outside the explicit control of mainstream journalism outlets.[126] Thus, audiences might return to *Top Gun* with new experiences of war through the media. Further, *Top Gun* 3D was released in the midst of growing political movements on the left and the right that reject American interventionism. In the following 2016 and 2020 presidential elections, past support for the Iraq War became shorthand within Democratic and Republican circles for a hawkishness despised by peace activists, libertarians, and/or isolationist nativists. To be clear, although the Reagan era was heavily militaristic, with vast expansions in America's global presence and foreign policy spending, *Top Gun* was not released in 1986 to an American public with a monolithic support for American power. It was for that exact year that Oliver Stone's anti-Vietnam War film *Platoon* won the

[125] Caldwell, *Televisuality*, 289.

[126] Christian Christensen, "'Hey Man, Nice Shot': Setting the Iraq War to Music on YouTube," in *The YouTube Reader*, ed. Pelle Snickars and Patrick Vonderau (Stockholm: National Library of Sweden, 2010), 204-217.

Academy Award for Best Picture. Still, various political developments since 1986, and a renewed sense of historical distance, present new opportunities for more critical interpretations of how *Top Gun* promotes the Navy.[127]

More specifically to this project, *Top Gun*'s depiction of the United States Navy presented fascinating cinematic opportunities for stereoscopic conversion. Ahead of the 3D conversion's release, then-Legend3D President Rob Hummel specifically connected the film's potential for 3D and its airborne aesthetic. Hummel argued "*Top Gun* lends itself to 3D due to the aerial flight" because you can bring "things off the screen if they are not attached to the edge of the screen."[128] Legend3D wanted these aerial shots to be as convincing as possible in 3D. Legend3D founder Barry Sandrew says the studio invited "active and retired Top Gun pilots to screen the dimensionalized aerial shots in one of Legend3D's RealD theaters so we could assess the accuracy of transient vertigo that resulted from the combat flight sequences."[129] These two quotes together suggest the potential not only for quality stereoscopic images but also for "authentic" engagements of the spectatorial body.[130]

These aerial scenes include two very different types of framing that lend themselves to different levels of stereoscopic depth cues. Most of the aerial flight sequences are largely composed of medium close-ups or close-ups of the pilots, on one hand, and extreme long shots

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[127] Nick Jones dives deeper into military-3D connections with his examination of *Avatar*: "The film's broad aesthetic as well as particular elements of its mise-en-scène reveal the extent to which digital 3D is currently employed as a medium for future-oriented spatial mapping, visual recording, and imperial domination. Firmly embedded within military-industrial frameworks, the simulations provided by digital 3D allow and propagate nominalist mapping, action at a distance, and a highly regimented, Cartesian visual field, and this process is performed both within and by the film." Nick Jones, *Spaces Mapped and Monstrous: Digital 3D Cinema and Visual Culture* (New York: Columbia University Press, 2020), 68.

[128] Giardina, "'Top Gun' Coming to Theaters in 3D."

[129] Failes, "Back into the danger zone: *Top Gun* 3D."

[130] For a look at the relationship between 3D cinema and flight sequences, see Sara Ross, "Invitation to the Voyage: The Flight Sequence in Contemporary 3D Cinema," *Film History* 24 (2012): 210-220.

of the planes in flight, on the other. These could have made for strange juxtapositions, as they necessitate cutting between two very different types of spaces, one intimate and the other panoramic. However, these sequences work together because, for the most part, the compositions of these shots lend themselves to a clear understanding of cinematic space. Most of the extreme long shots in *Top Gun* 2D keep the planes within the borders of the frame, making it easier for audience to comprehend the plane's spatial position in the overall setting (fig. 8). Further, such framings prevent edge violations. Edge violations refer to the possible disruption of the 3D illusion when objects are cut off by the left or right edge of the frame. The 3D illusion depends on, firstly, the difference between the left and right eye image and, secondly, the ability of the brain to fuse these together for one, fully rounded impression. When an object is cut off at the frame, the brain can fail to fuse the left- and right-eye views into the impression of a single three-dimensional object. Especially if the object is meant to appear as coming out of the screen, our brain effectively struggles to reconcile the theatrical screen's window blocking something that stereoscopic depth cues suggest to be in front of that window. What results is a double image, a shattered illusion. Because these planes are largely centered in the frame in extreme long shots, *Top Gun* 3D avoids this issue in the aerial flights.

Similarly, the close-up shots in the aerial flight scenes suit the 3D conversion, maximizing a sense of spatial and narrative clarity. For these medium close-ups inside the cockpits, the characters are generally positioned in the center of the frame (fig. 9). This framing minimizes the possible edge violation. Additionally, these scenes rely heavily on dialogue between the pilots to explain what precisely is going on. To ensure clarity, the sound of a voice is generally synced with a shot of the character who is speaking. Add helmets with the names of the

characters, and *Top Gun*'s medium close-ups have all the formal details to underline a sense of where we are in the cinematic space and in the narrative.

Figure 8: Extreme long shots of the planes in flight keep the planes at center of the frame, preventing the sort of edge violations problematic for 3D.

Figure 9: Close-ups in the aerial sequences keep the pilots at center of the frame, away from left and right edges.

Furthermore, for the 3D conversion, these medium close-ups are rendered in stereoscopic depth with tremendous attention to detail. Popular discourses have emphasized scenes of action and spectacle as best suited for 3D, as these are common in the movies that studios tend to release in 3D. However, in terms of stereoscopic legibility, human vision and cognition favor close views of humans. Human eyes are less than 3 inches apart from each other, and thus, humans can only see objects up to a certain distance away in stereoscopic depth. That is, once an object is too far, the distance between the two eyes is not enough to offer significantly different enough views. The shots in the Legend3D conversion render these medium close-ups in great detail, giving the faces a fully rounded quality in a way that mimics how we see people in everyday life.

On an ideological level, the effective use of 3D space in these medium close-ups facilitates closer identification with American power, particularly when considering Miriam Ross's theorization of our relationship to stereoscopic images. Ross notes the immersive potential of 3D cinema, in "which the body is located within and in relation to, rather than at a fixed distance from, the content."[131] In essence, we inhabit the same space as the characters. With the medium close-ups of the pilots for the 3D conversion, we are effectively placed in the space of the pilots' planes. *Top Gun* has almost no shots from the inside of an "enemy" plane.[132] Although these medium close-ups in the original 2D version encourage us to identify with the American pilots, the 3D conversion goes even further and puts us in the same space. If *Top Gun* can be interpreted as a recruitment tool for American armed forces, viewers have a chance to sit in the cockpit and experience the exhilaration (but only some of the horror).

[131] Ross, "The 3-D aesthetic: *Avatar* and hyperhaptic visuality," 383.

[132] One notable exception is a reaction shot when Maverick flies inverted to flip off a Russian pilot.

This sense of inhabiting the same space also occurs with some of the most aesthetically pleasing shots of the film: aerial shots in which the camera moves with the airplane in flight, anchored to some part of the plane. In these shots, some part of the plane is visible but appears to be static as everything around it moves (fig. 10). Generally, in 3D filmmaking, too much lateral movement can produce strobing that can disrupt the 3D effect. Instead of risking such issues, films with fast-moving objects can anchor themselves to the object in motion, watching everything around it move past. Indeed, in everyday experience, as fast as we might be going while driving in a car, we experience the car as a static space. *Top Gun* features three of these shots in its opening credit sequence, and they recur throughout the film. Just as the medium close-ups in 3D put us in the same space as the American pilots, these shots are dependent on the plane for their spatial bearings. These shots have a similar effect in the 2D version, but it has an especially profound impact in the 3D conversion, where the figurative detail of the plane is rendered with greater depth cues than objects moving past.

This identification with the Navy pilots goes the furthest with POV shots of the missile crosshairs. Throughout *Top Gun*, the audience is given clear views of target practices and actual enemies moving into and out of the crosshairs (fig. 11). Emphasizing the film's ideological and spatial initiation into American power, these allow us to imagine gunning down an enemy just as Maverick might. In one of the oddest creative choices in *Top Gun* 3D's conversion, the crosshairs and the target exist on different planes in z-space. As one might expect these two to be flattened together, the image comes across as both incredibly artificial and immersive. In another media context of 2013 not nearly as strong in 1986, audiences more familiar with video games and their three-dimensional graphics might find this image similar to the perspective in a first-person shooter. *Top Gun* was already a film about identifying with American power in 1986, but

with stereoscopic upgrades to the medium close-ups, the anchored aerial shots, and these crosshair POVS, the utopian world of the military seems even more appealing.

Figure 10: The anchoring of the camera in some shots makes the planes essential for our spatial bearings, especially in the 3D version of *Top Gun*.

Figure 11: The 3D conversion separates the crosshairs and the target onto separate planes in z-space, even if perceptual logic suggests they be flattened together.

Thus far in this section, I have explored the implications of 3D conversion for how we might understand *Top Gun*'s ideological alignment with American power. But as Stuart Hall emphasizes, viewers actively read texts, often in ways that might run contrary to the apparent "intent" of the film. In recognition of textual polysemy, I now turn to explore the possible effects of the 3D conversion on the possible queer readings of *Top Gun* as a homoerotic text. If the 3D conversion largely intensifies identification with the film's hyper-militarism, the stereoscopic parallel text has a much more complicated relationship with the film's sexual undercurrents, alternately working with and against key moments that resonate with such a reading.

The possible gay subtext of *Top Gun* is prevalent in popular discourses about the film, including conversations around the time of the film's 2013 3D rerelease. *The Daily Beast*'s article on the "Most Unintentionally Gay Movies" suggests that *Top Gun* is "generally regarded as the *Citizen Kane* of homoerotic cinema."[133] Blogger Noah Gittell uses this reading to frame his experience of seeing *Top Gun* 3D in a piece entitled, "Why the Homoeroticism in 'Top Gun' Matters."[134] Before detailing the many lines of dialogue and scenes that support this theory, he writes that "although I was prepared for some allusions to homosexuality, what I encountered in the theater last weekend ran deeper than some incidental references."[135] Revisiting the film after nearly two decades of reconsideration and discussion, this viewer went into and then left *Top Gun* 3D with new ways of understanding the film. Tania Modleski has argued this film is more about homosociality and misogyny than homosexuality.[136] My point here is not to argue whether

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[133] "Most Unintentionally Gay Movies," *The Daily Beast*, November 7, 2011, http://www.thedailybeast.com/galleries/2011/11/07/most-unintentionally-homoerotic-movies-photos.html#slide_2.

[134] Noah Gittell, "Why the Homoeroticism in 'Top Gun' Matters," *Reel Change*, February 12, 2013, http://reelchange.net/2013/02/12/why-the-homoeroticism-in-top-gun-matters/.

[135] Gittell, "Why the Homoeroticism in 'Top Gun' Matters."

[136] Tania Modelski, "Misogynist Films: Teaching *Top Gun*," *Cinema Journal* 47, no. 1 (Autumn 2007): 101-105.

this film is about homosexuality or not, but rather to see how the 3D conversion potentially affects such a counter reading.

As discussed in the previous section, *Top Gun* and Tony Scott's work in general make heavy use of long lenses to compress space, which is arguably counterproductive when adding 3D to a film. In a number of scenes, this compression of space in *Top Gun* 2D might also suggest sexual tension between Tom Cruise's Maverick and Val Kilmer's Iceman. In their second encounter, as seen in the 2D version, the two are framed together in an over-the-shoulder two shot, with the character facing the camera framed in a medium close-up. Already, this scene relegates Goose and others nearby to offscreen space, overemphasizing the relationship between Maverick and Iceman. As the conversation between the two continues, the camera moves in for close-ups, and a longer lens is then used to collapse the space between them (fig. 12). The characters have not moved positions, but there seems to be significantly less space between them. In this way, film form effectively brings these two closer and closer together, suggesting that their competitive rivalry might be coupled with latent sexual desire.

Top Gun 3D problematizes such an interpretation of this specific encounter between Maverick and Iceman. Although the long lens work to bring the two characters together, the 3D conversion separates them off onto different depth planes, adding extra space into the shot. This partially undoes the formal mechanics of *Top Gun* 2D that contribute to a counter reading strategy. A similar visual pattern, of isolating Maverick and Iceman with progressively more confined framings, occurs when the two argue in the locker room, and again, the 3D conversion adds a greater sense of distance between the two characters. Here, the aesthetic challenge of spatializing a long lens shot, on the production end, becomes a subtextual challenge of renegotiating a counter reading, on the reception end.

Figure 12: A long lens brings Tom Cruise's Maverick and Val Kilmer's Iceman closer together, but the 3D conversion pushes them back apart.

But even if *Top Gun* 3D sometimes contradicts the film's homoerotic subtext, the 3D conversion at times opens up new subtextual possibilities along these lines. *Top Gun* allows for counter readings not only with the relationship between Maverick and Iceman but also between Maverick and his co-pilot Goose. Consider a shot of Maverick and Goose side by side as they serenade Charlie with "You've Lost That Lovin' Feelin'" (fig. 13). In this shot, Maverick and Goose are framed in medium close-up in a two-shot. There are at least four other men visible behind them, facing the direction of the camera. Charlie, ostensibly the intended audience for this performance, is facing away from the camera, at the edge of the frame. In the 2D version of the film, there is already the sense that this scene is perhaps less about Maverick and Charlie and more about Maverick and Goose.

The 3D conversion can enhance this effect by turning Charlie into a stereoscopic problem. As previously mentioned, a figure cut off by the left or right edge of the frame can create a distorted double vision, as the brain is not properly tricked into processing the visual information to perceive a singular, three-dimensional figure. The effects of such edge violation

explain why filmmakers shooting in native 3D avoid figures at the edges of the frame. Intentionally or not, Charlie becomes a technical error in this shot of *Top Gun* 3D. At the edge of the frame, her figure is blurred and illegible, while Maverick and Goose are centered in clear stereoscopic depth. If the addition of three-dimensionality troubles our experience of the physical and emotional distance between Maverick and Iceman, the breakdown of stereoscopic imagery here, however peripheral and ephemeral, contributes to the focus on the intimate relationship between Maverick and Goose.

When the song "You've Lost That Lovin' Feelin'" emerges again at the end of the film, it is unclear whether the song triggers the memory of Maverick's audience, Charlie, or his singing partner, Goose. His somber expression, followed by an eyeline match to a jukebox with no one by it, potentially suggests the ghostly presence of Goose. The story turns out to be much more probable, with Charlie having chosen the music. The two lovers reunite, and the final shot of the film is of Maverick holding Charlie and caressing her face (fig. 14). Stunningly, the two of them do not kiss in this particular shot, and the scene is characterized by a sense of hesitation. The two are shot in profile, facing each other. In effect, the 3D conversion emphasizes the space *between* the two characters, exaggerating the awkwardness of this encounter. The earlier scenes with Maverick and Iceman conceived of space in terms of z-space, the characters relative distance away from the camera. Here, the space between Maverick and Charlie is lateral, and the z-space instead creates the sense that they are not quite together in this moment. They are not two bodies enclosed in a singular 2D frame, but they are two bodies separated in 3D space.

Figure 13: When Maverick sings "You've Lost That Lovin' Feelin'," Charlie is positioned at the left edge of the frame, resulting in a frame violation.

Figure 14: The 3D conversion emphasizes the space between Charlie and Maverick in the film's the final shot.

Taken together, the different readings above illustrate the analytical and interpretative opportunities of parallel textuality. To some, it might seem a fruitless task to seriously explore the aesthetic and thematic gaps between parallel texts such as 2D films and their 3D conversions. And yet, such analysis uncovers not only what can be lost but also what might be gained in the process of 3D conversion. I started off this chapter by exploring how the movement of texts across mediums can provoke negative reactions to perceived perversion of artistic intent. Further,

this may seem a desecration motivated by profit; in the words of *The Simpsons*, "See What You Saw Before, Except It Costs More." By first addressing how 3D conversion companies understand their creative labor of converting library titles, and then engaging in a close reading that troubles the idea that a 3D rerelease is simply "What You Saw Before," this chapter provides a path to better understanding the creative and intellectual labor of reformatting texts.

As mentioned at the beginning of this chapter, I acknowledged that conversions of classic 2D titles into 3D represent a relatively small percentage of 3D conversion companies' output. Still, I find that the specters of reformatting and textual perversion detailed here can affect how *all* 3D conversion work is popularly understood. In the next chapter, I build on the cultural contexts and analytical premises established here to then consider what happens when the temporal gap between a 2D film's production and its 3D conversion is collapsed, especially in the context of larger anxieties about digital technologies.

Chapter 3

How (Not) to 3D: Popular and Professional Logics for 3D Conversion in a Digital Age

Cinematographer Roger Deakins shot *Blade Runner 2049* (Stereo D cr., 2017), but he does not vouch for all versions of the film. In October 2017, Deakins wrote a comment on his personal website implicitly distancing himself from Stereo D's conversion of the film into 3D. The DP wrote,

> My preferred version is the standard 2D widescreen version. A problem I have with some viewing systems is their use of silvered screens. The image projected on a silvered screen lacks saturation as well as density as it falls off from a hot spot in the center of vision. This may not be so apparent for someone sitting in the optimum viewing seat but it is a compromise in terms of image quality wherever you are seated, though it maybe a compromise worth accepting if you are a fan of 3D.[1]

By "some viewing systems," Deakins seems to be referring to RealD 3D. This digital stereoscopic projection system requires silver screens to retain the polarization, which then allows the glasses to separate the left and right eye images.[2] He is careful not to name RealD or even explicitly mention the 3D conversion of *Blade Runner 2049*, but his comment is a statement of creative intent that emphasizes how certain versions better reflect his artistic vision than others. In one sense, even though the specific critique is leveled at the projection system rather than 3D technology, Deakins's comment delegitimizes the 3D version of this particular film. (At the same time, this then highlights *Blade Runner 2049* as a unique but parallel experience.)

If the comment itself left any ambiguity, film reporters writing about Deakins' comments would make the rejection of 3D explicit. IndieWire's Zack Sharf paraphrases Deakins's

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[1] Roger Deakins, comment on user DanBull, "Blade Runner 2049: 2D or 3D?," *Film Talk* (forum), https://www.rogerdeakins.com/film-talk/blade-runner-2049-2d-or-3d/page-1/.

[2] For a theoretical analysis of the 3D glasses themselves as a "further apparatus," see William Brown, "*Avatar*: Stereoscopic Cinema, Gaseous Perception and Darkness," *Animation* 7, no. 3 (2012): 259-271.

comment: "Don't see *2049* in 3D."[3] In a tongue-in-cheek fashion, Sharf continues saying, "Not only will 3D cost you a more expensive film ticket, but it will also screw with Deakins' intended photography. And who wants to mess with Deakins?"[4] Here, Sharf interprets Deakins's statement of preference as a rejection of the 3D version. Indeed, Deakins himself acknowledges that some fans of 3D might want to watch the stereoscopic conversion despite what he sees as a compromise. Sharf's characterization exemplifies two popular tropes of 3D criticism: attacking the 3D surcharge, and questioning 3D conversion's relationship to authorial intent.[5]

I open with this story because it demonstrates how the questions of parallel texts and reformatted movies apply not only to 3D rereleases of classics, as explored in Chapter 2, but also to contemporary films converted into 3D for the simultaneous co-release of 2D and 3D versions. *Top Gun* 3D hit screens 27 years after its 2D counterpart. By contrast, *Blade Runner 2049* in 3D hit screens the same day as the 2D version. In essence, this chapter will explore the implications of closing the temporal gap between two parallel texts, both for the conversion process and for our understanding of the film texts. To be clear, the conversion of contemporary films into 3D represents the vast majority of 3D conversion work. But even though 3D conversions of studio classics represent such a small fraction of these companies' output, largely because of the relatively few examples' mixed success at the box office, I believe that the 3D rereleases of older

[3] Zack Sharf, "Roger Deakins Thinks Seeing 'Blade Runner 2049' in 3D is Not a Good Idea," *IndieWire*, October 13, 2017, http://www.indiewire.com/2017/10/roger-deakins-blade-runner-2049-dont-watch-3d-1201886963/.

[4] Sharf, "Roger Deakins Thinks Seeing 'Blade Runner 2049' in 3D is Not a Good Idea."

[5] As discussed in Chapter 1, IMAX dramatically cut back on 3D screenings in 2017, and *Blade Runner 2049* was among the first films to be released only in 2D on North American IMAX screens, despite there being a 3D version available on RealD 3D screens. Thus, the *Blade Runner* sequel hit theaters after it was already clear that 3D was no longer a priority in the North American market (even if its continued niche role there and its overwhelming success in international markets drove continued 3D conversions). In 2017, *Transformers: The Last Knight* (native 3D + Prime Focus ver.) was the only live-action major studio release to be shot with stereoscopic cameras. In other words, live-action 3D films at this time were overwhelmingly produced through 3D conversion.

2D films better illustrate 3D conversion's foundational interpretive labor.[6] Further, while the reformatting of texts for different mediums is far from new, platform-parallel texts have more commonly been separated by industry standards concerning staggered releases, colloquially known as "windows." Thus, this chapter builds on the arguments developed in the previous chapter, introducing additional layers of aesthetic and cultural issues.

Specifically, this chapter situates 3D conversion in broader debates about digital cinema and how digital technologies have revised our understanding of film as analog and indexical. The simultaneous co-release of 2D and 3D versions for contemporary films not only closes the gap between release dates but also affects the temporal relationship between 2D filmmaking and 3D conversion. As this chapter will detail, 3D companies convert contemporary 2D footage in parallel with other post-production processes, meaning that conversion often begins *before* the completion of a given shot. Such an examination of the conversion process will highlight how digital technologies have affected post-production workflows in ways that complicate purely linear understandings of 3D filmmaking. The first section of this chapter examines competing discourses about the definition of cinema in an age of digital filmmaking, and how these conversations have impacted the perception of 3D conversion as a(n) (il)legitimate filmmaking practice. As with both 3D technology and reformatting practices, digital cinema tools have inspired critical and scholarly debates that represent yet another layer of potential cultural baggage for 3D conversion.

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[6] The mixed success of 3D rereleases was clearly demonstrated by the boom-and-bust of Disney's attempts with its animated library. Although the 3D conversion of *The Lion King* (1994) proved a success, the subsequent box office disappointments for *Beauty and the Beast* (1991), *Monsters Inc.* (2001), and *Finding Nemo* (2003) ultimately led Disney to cancel its theatrical release of Legend3D's *The Little Mermaid* (1989). The other features were converted in-house. Ben Fritz, "Disney cancels 'Little Mermaid 3-D,' dates 'Pirates 5' for 2015," *Los Angeles Times*, January 14, 2013, http://articles.latimes.com/2013/jan/14/entertainment/la-et-ct-disney-cancels-little-mermaid-3d-pirates-5-2015-20130114.

To better understand the textual implications of dual 2D and 3D versions for contemporary films, the second section in this chapter analyzes *Cinema Blend*'s online column entitled, "To 3D or Not to 3D." Designed to help moviegoers choose whether they want to see the 2D or 3D version of a given film, the articles in this series highlight 3D's effect on the popular perception of consumer's choices. But more importantly, *Cinema Blend*'s reviews reveal how non-3D experts use specific aesthetic and cultural criteria to evaluate 3D conversion and then package their observations for a broad moviegoing public. The column largely judges 3D in *quantitative* terms, again illustrating the bind of 3D as needing to find the balance between too much and too little 3D.

The rest of this chapter examines how creative interpretation is at work in the conversion of contemporary films into 3D. This last section draws heavily on my original interviews with professionals who either currently work or have worked at 2D-to-3D conversion companies. In essence, I see this in part as a space for those working in 3D conversion to explain their process, but I also frame their creative rationalizations as possible responses to the aesthetic and cultural assumptions detailed in the preceding sections. These practitioners' characterizations of 3D conversion suggest *how* we might rethink creative labor to make sense of these companies' work beyond *Cinema Blend*'s largely quantity-driven analysis. Taken as a whole, this chapter reframes 3D conversion to not only better understand these professionals' work, but also to more fully explore how definitional debates about cinema impact our recognition of creative labor more broadly in the digital age.

Visual Effects, Digital Tools, and Cultural Assumptions

Throughout this dissertation, I have referenced cultural and aesthetic perspectives that privilege the analog over the digital in definitional debates about cinema, as well as scholarship that has sought to challenge assumptions about digital media. Toward the end of Chapter 1, I referenced Lev Manovich's theorization that posits live-action footage as but one element in digital cinema's animation-based art, and I argued that such a definition can help us better understand the creativity of practices such as 2D-to-3D conversion.[7] I have also considered how Hye Jean Chung's heterotopic analyses resist the popular tendency to dematerialize the global labor required for digital visual effects in contemporary filmmaking.[8] Ultimately, I see such scholarship as directly or indirectly addressing how particular film cultures hold on to a perception of cinema's indexical, celluloid roots in a manner that excludes certain forms of cinematic creativity. Thus, this section will expand on the cultural implications of debates over digital cinema and digital filmmaking tools.

In particular, this chapter will analyze how the cultural conversations around 2D-to-3D conversion echo preexisting debates about computer-generated imagery and visual effects. In the previous chapter, I suggested that the anxiety surrounding the conversion of classic 2D titles into 3D was tied up in larger discourses about the repurposing of studio libraries for ancillary markets. However, given that films such as *World War Z* (Prime Focus ver., 2013) are released in 3D on its opening day, specifically *historical* concerns about perversion or desecration do not apply in quite the same way. Rather, the simultaneity of 2D and 3D releases puts further emphasis on whether the 3D conversion process is seen as part of a singular filmmaking process,

[7] Lev Manovich, *The Language of New Media* (Cambridge: The MIT Press, 2001).

[8] Hye Jean Chung, *Media Heterotopias: Digital Effects and Material Labor in Global Film Production* (Durham: Duke University Press, 2018).

or as a separate process that parallels or postdates traditional 2D filmmaking. Indeed, the widespread critical favoring of native 3D photography over 3D photography suggests a tendency to understand the essence of cinema as located in production, not post-production. Unlike 3D conversion, native 3D fits in with traditional understandings of cinema where the profilmic, the index, and authorial intent are temporally and materially aligned. Popular film critics, scholars, and cinephiles alike often drawn on certain conception of cinema based on photography and an indexical relationship between image and subject, one that has been challenged by the move toward digital technologies.

In this section, I focus on digital cinematic practices that are arguably most proximate to the perception of 3D conversion, such as computer-generated visual effects. However, I see these specific practices as part of a broader cultural and scholarly debate concerning how digital technologies have challenged traditional understandings of cinematic production, distribution, and exhibition. Jason Sperb has researched the "role of nostalgia—primarily *nostalgia for film* but also the analog era more generally—in the time of digital cinema."[9] In part, I see such a nostalgia for film, as well as its perceived indexicality, as playing a significant role in the critical reputation of 3D conversion. In Chapter 1, I discussed how the industry positioned digital 3D as a "Trojan Horse" to push exhibitors toward digital projectors, and indeed, this move away from celluloid in exhibition followed decades of increasing digitization in production and post-production processes. John Thornton Caldwell writes that nonlinear editing systems of the 1990s "encouraged, or fed, the televisual appetite for stylistic volatility and infinite permutations."[10] In

[9] Jason Sperb, *Flickers of Film: Nostalgia in the Time of Digital Cinema* (New Brunswick: Rutgers University Press, 2015), 1.

[10] John Thornton Caldwell, *Televisuality: Style, Crisis, and Authority in American Television* (New Brunswick: Rutgers University Press, 1995), 83.

her cultural history of new cinematic technologies, Ariel Rogers acknowledges the "diversity of digital technology's applications in cinema—including digital previsualization, cinematography, sound, nonlinear ending, visual effects, projection, and distribution through the Internet."[11] Instead of shying away from this heterogeneity, Rogers embraces the "messiness of the digital moment," contending that "this instance of cinematic change was as much epistemological and experiential as it was technological."[12] I reference these varied conceptions of digital transformation because I see these broader conversations about digital media as formative for how critics and audiences make sense of digital effects and 3D conversion.

Although this first section discusses similarities between the debates concerning 2D-to-3D conversion and those concerning digital effects, I want to avoid conflating these processes and thus denying their specificity. According to Julie Turnock, scholars tend to flatten industrial and technical distinctions through "catchall" understandings of visual effects that conflate computer animation, motion capture, digital intermediates, and 3D.[13] And indeed, my dissertation seeks to better understand what is unique to stereo conversion as production practice and creative process. Still, I find it essential to consider parallels with digital visual effects, as I see both vfx vendors and 3D conversion companies as devalued because of analog-based biases. Further, my work is as concerned with the public perception of technologies as the technologies themselves, and although lacking in specificity, catchall understandings of visual effects play in an important role in how audiences understand 3D and how creative workers see their own work.

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[11] Ariel Rogers, *Cinematic Appeals: The Experience of New Movie Technologies* (New York: Columbia University Press, 2013), 92.

[12] Rogers, *Cinematic Appeals*, 98.

[13] Julie A. Turnock, *Plastic Reality: Special Effects, Technology, and the Emergence of 1970s Blockbuster Aesthetics* (New York: Columbia University Press, 2015).

Stephen Prince begins *Digital Visual Effects in Cinema* by directly addressing the cultural status of contemporary digital effects. The book's very first paragraph references the "common wisdom" that special effects "take movies far away from realistic characters, situations, and locations."[14] Prince sees this as related to a perceived "dichotomy in film, between the real and the fantastic," one that is seen as dating back to the differences between the Lumieres' actualities and Georges Melies's trick films.[15] However, Prince's work suggests that scholarly and critical dismissals of blockbusters, spectacle, and fantasy prevents us from fully grasping with the complex aesthetics of visual effects. Prince pushes even further by then relating such suspicions of visual effects to theorizations of cinema as a medium of photography and the index. He suggests that "photographic models of cinema…provide an insufficient account of the ways that cinema operates in a narrative mode and as a medium amalgamating different image types and categories."[16] Rather than completely abolishing realism and the index as frameworks for understanding the cinema, Prince attempts to underline how visual effects provide opportunities for greater realism and often have a basis in indexicality (as with motion capture). More broadly, he emphasizes how "visual effects in narrative film maintain a continuity of design structures and formal functions from the analog era to the digital one."[17] By reframing the conversation about visual effects, Prince challenges purist assumptions of cinema as inherently indexical or realistically.

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[14] Stephen Prince, *Digital Visual Effects in Cinema: The Seduction of Reality* (New Brunswick: Rutgers University Press, 2012), 1.

[15] Prince, *Digital Visual Effects in Cinema*, 1.

[16] Prince, *Digital Visual Effects in Cinema*, 2.

[17] Prince, *Digital Visual Effects in Cinema*, 4.

The negative perception of computer-generated imagery is not only limited to film critics and scholars, as such biases have affected politics within the visual effects industry itself. This is perhaps best illustrated by the industry's reception of the computer-driven effects in *TRON* (1982). Reflecting on the occasion of the film's 20th anniversary, director Steven Lisberger explains why the film was not nominated for the visual effects Oscar: "The Academy thought we cheated by using computers."[18] Indeed, the IMDb's trivia page for the film suggests that the film was "disqualified."[19] I have personally not found archival evidence to support the specific language concerning disqualification, but whatever the precise truth might be, this tidbit persists as a piece of movie history lore and "common sense." Given the predominance of computer-generated imagery in Academy Award winners for visual effects, the notion of CGI as disqualifying seems especially ironic in retrospect.[20] More importantly, the transition to digital visual effects illustrates how traditional understandings of filmmaking craft can directly impact media practitioners and the popular perception of their work.

For stereoscopic filmmaking, the specters of realism and the index are perhaps most clear in Philip Dhingra's website *Real 3D or Fake 3D*, first mentioned in the introduction. This

[18] Glen Helfand, "Tron's 20th Anniversary / Director discusses groundbreaking computer animated film," *SF Gate*, January 9, 2002, https://www.sfgate.com/news/article/Tron-s-20th-Anniversary-Director-discusses-3236009.php#page-2.

[19] *TRON* Trivia, IMDb, accessed December 16, 2019, https://www.imdb.com/title/tt0084827/trivia?tab=tr&item=tr1433499

[20] The most recent winners for visual effects are *First Man* (2018), *Blade Runner 2049* (2017), *The Jungle Book* (2016), *Ex Machina* (2015), *Interstellar* (2014), *Gravity* (2013), and *Life of Pi* (2012). It is notable that while *The Jungle Book*, *Gravity*, and *Life of Pi* represent the legitimizing of largely computer-generated worlds, much of the conversation around *First Man* revolved around its practical effects such as miniatures. As *Film School Rejects*'s Jacob Trussell put it, "The shuttle effects in Damien Chazelle's First Man look remarkably real because they were in part created through practical miniatures. These miniatures were designed at 1:30 scale by Ian Hunter, the virtuoso behind the Oscar-winning effects in Interstellar. The usage of these miniatures over CG give the effects a more realistic quality, according to Hunter." Jacob Trussell, "Practical Effects Have a Solid Chance at the Oscars This Year," *Film School Rejects*, December 19, 2018, https://filmschoolrejects.com/practical-effects-have-a-solid-chance-at-the-oscars-this-year/.

regularly updated page lists which 3D films are real, shot using 3D cameras, and which are converted by companies such as Gener8, Legend3D, Prime Focus, and Stereo D. To be sure, film theorists such as D.N. Rodowick would take issue with the notion of digital images as having an indexical relationship to reality, given that the profilmic material is translated not to an impression of itself but to code.[21] Still, discussions about the difference between native 3D and converted 3D suggest that a perceived relationship between the profilmic and an image, even if now technically more discontinuous, drives popular understandings of converted 3D as somehow fake. The introduction to *Real 3D or Fake 3D* makes this especially clear: "If you only have one eye's worth of content, you can't just make up the content for the second eye."[22] This rationalization makes a clear distinction between the perceived indexicality of native 3D, shot during production by two cameras from two distinct positions, and converted 3D, which effectively creates a stereo pair based on 2D footage in post-production. In other words, just as the CGI in *TRON* is cheating, 3D conversion is "made-up" stereography.

Despite these discursive similarities between digital visual effects and 2D-to-3D conversion, digital effects represent integral components of all versions of a particular text, while 3D conversions are merely optional. In other words, you cannot see *The Avengers* (Stereo D cr., 2012) without the effects, but you can see it without 3D. Thus, even if the creative labor of 3D conversion might be misunderstood in a manner much like that of visual effects, 3D conversion still bears the marks of reformatting, putting it at a greater remove from a perceived "original." Indeed, this distinction is perhaps best illustrated by a 2011 *Variety* report suggesting that Academy Award "side-stepped the issue of whether to consider 3D conversion as part of the

[21] D.N. Rodowick, *The Virtual Life of Film*, Cambridge: Harvard University Press, 2007.

[22] *Real 3D or Fake 3D*, accessed December 16, 2019, https://realorfake3d.com/.

visual effects category" by not shortlisting high-profile conversions such as *Clash of the Titans* (Prime Focus cr., 2010).[23] Even if digital effects might be suspect as inauthentic to cinema's realistic roots, they at least conform to the perception of a film as a singular, bounded text.

In this section and throughout this chapter, I acknowledge a variety of creative and technological developments related to digital cinema, but I do so in terms that suggest these changes as processes of negotiation rather than as fundamental shifts that require entirely new theoretical paradigms. That is, although I argue for rethinking 3D conversion in terms that better conceptualize its creative labor and its textual implications, other scholars have framed digital cinema and specifically 3D as representing more drastic ruptures in our understanding of media images and space. Holly Willis posits the contemporary moment of transition as a "rampant dismantling and reconfiguration" that can be explained by "the need for new expressions and experiences of identity and subjectivity in a world that is increasingly mediated by networks and, as such, escapes our ability to perceive and comprehend it using tools and abilities of the past."[24] Writing about digital 3D, Nick Jones contends that "stereoscopic media are ultimately nonimagistic and so demand new tools for analysis that are not beholden to the existing, planarcentric tools of film analysis."[25] In this regard, I do not go as far as Willis and Jones do. While I find their research valuable for thinking through the expansive theoretical ramifications of digital technologies, my focus on Hollywood production and on cinematic taste cultures, as well as historical continuities of cultural discourse, requires a more measured approach. Film critics, moviegoing audiences, and, most importantly, 3D conversion professionals still heavily

[23] Rachel Abrams, "Kudos Roundup," *Daily Variety*, January 6, 2011.

[24] Holly Willis, *Fast Forward: The Future(s) of the Cinematic Arts* (London: Wallfower Press, 2016), 2.

[25] Nick Jones, *Spaces Mapped and Monstrous: Digital 3D Cinema and Visual Culture* (New York: Columbia University Press, 2020), 2.

draw from more traditional ways of thinking about cinema. While the notion of the "post-cinematic" might be useful for other research approaches to digital cinema, the idea of post-cinema would likely prove alien to many movie fans, casual or cinephilic, and even terrifying for industry professionals.[26] Put differently, while I see value in moving past the index, I hesitate in this context to move past cinema (or, as suggested in the previous chapter, television).

If this section has focused on the relationship between digital technology and production practices, the next section will be more concerned with 3D conversion in terms of digital distribution and consumption. Indeed, 3D conversion at once represents cultural reservations about both digital effects *and* digital distribution's shrinking of traditional distribution windows. Consumers have always had choices about when, where, and how they want to consume a film text, but the nature of that choice has evolved dramatically according to shifts in industry and culture. In the first half of the twentieth century, the predominant method of theatrical distribution was tiered releasing, with first-run, second-run and x-run theaters for filmgoers with different class backgrounds and/or different levels of enthusiasm. The studios themselves owned a disproportionate amount of first-run theaters, which would have the freshest prints for the highest prices, often in high-quality venues owned by the studios themselves. As Frederick Wasser puts it, "those viewers who were patient or indifferent enough to wait for a third-run showing paid very little to see the movie."[27] With the degradation of the film prints aside, the film itself did not modify across these tiers or windows; rather, the financial and social conditions for the consumption of the film changed.

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[26] Holly Willis uses the term "post-cinematic," drawing from Steven Shaviro's writing on "post-cinematic affect." Willis, *Fast Forward*; Steven Shaviro, *Post-Cinematic Affect* (Winchester, UK: 0-Books, 2010).

[27] Frederick Wasser, *Veni, Vidi, Video: The Hollywood Empire and the VCR* (Austin: University of Texas Press, 2001), 30-31.

As demonstrated in Chapter 2, television broadcasts and later home video would require material changes to film texts. In these instances, audiences would consume reformatted texts *after* the theatrical window. Some cinephiles have placed stock in the theatrical window as the "proper" scene of the cinema, a concern best exemplified by the debate over Netflix films' relatively short, exclusive theatrical runs.[28] As Chuck Tryon has put it, cinema's social role has changed in the digital era, due to the "accelerated velocity with which [movies] pass through theaters and into other formats."[29] In essence, 3D represents a sort of window *within* the theatrical window, one that challenges the unity of the text on the day of release. Tryon refers to the perception that 3D "served as an 'upgrade' over 2D, one that depended on viewing movies on the big screen but also one that contributed to the redefinition of projectors as computers."[30] To be sure, 3D versions do not represent the only modification for film texts in theatrical distribution. For instance, the *Avatar* release reportedly required 18 different deliverables for the domestic market alone.[31] However, most of these variations are typically not apparent to the general moviegoing public, while 3D represents an alteration obvious to even the most casual moviegoer, if only for the fact that they would need to put on the glasses. By analyzing *Cinema Blend*'s column advising whether moviegoers should see a film in 2D or 3D, the next section

[28] Director Steven Spielberg found himself at the center of this debate when he was reportedly going to propose rules for the Academy Awards that would effectively ban Netflix films from Oscar eligibility. His logic at the time: "Once you commit to a television format, you're a TV movie." Brett Lang, "Steven Spielberg vs. Netflix: How Oscars Voters Are Reacting," *Variety*, March 5, 2019, https://variety.com/2019/film/awards/steven-spielberg-oscars-netflix-1203155528/.

[29] Chuck Tryon, *On-Demand Culture: Digital Delivery and the Future of Movies* (New Brunswick: Rutgers University Press, 2013), 180.

[30] Tryon, *On-Demand Culture*, 179.

[31] Carolyn Giardina, "How 'Avatar' changed the rules of deliverables," *The Hollywood Reporter*, March 25, 2010, https://www.hollywoodreporter.com/news/how-avatar-changed-rules-deliverables-22027.

will address the textual implications for 3D conversion as a confluence of "visual effect," reformatted text, and a window-within-a-window.

"An Unbiased, Seven-Point System": Quantity-as-Quality in Evaluating 3D Conversion

This section will take a close look at *Cinema Blend*'s column "To 3D or Not to 3D," which advises moviegoers as to which version of a film they should see.[32] As briefly discussed in Chapter 1, this column effectively ties aesthetic and experiential value to monetary value, positing whether one should pay the stereoscopic surcharge or save their money. I also noted the extent to which quantity, as much as quality, undergirds the rubric for valuation. This section will elaborate on the ways in which this online publication weighs the value of 3D conversion and of 3D more broadly. Each article is broken into seven categories: fit score, planning & effort score, before the window score, beyond the window score, brightness score, glasses off score, and audience health score. The reviewer provides a score out of 5 in each of these categories, adding up to a final score out of 35. Despite the veneer of objectivity, this rubric rests on a number of assumptions of what 3D is and/or should be. I specifically focus on the first four of these categories, grouped into pairs, as they exemplify how the column's attitudes toward 3D cinema have been affected by broader cultural debates about stereoscopic cinema and aesthetics.

Importantly, 3D conversion professionals are fully aware of *Cinema Blend*'s reviews. Jared Sandrew, who formerly worked at Legend3D but now supervises the 3D for live-action Disney films, knows off the top of his head that he received perfect 35 scores for his films *The*

[32] There appears to be limited information on *Cinema Blend*'s background. The company's LinkedIn page describes the publication as "the web's most popular, independently owned entertainment site. Reporting on movies, television, video games, and pop culture CINEMABLEND is the go-to source for today's plugged-in generation. Our engaging content is read by 14 million unique visitors connecting with more than 50 million pages a month. Founded in 2003, CINEMABLEND is based in Portland, Oregon with outposts in New York and Los Angeles." "CINEMABLEND," LinkedIn, accessed March 5, 2020, https://www.linkedin.com/company/cinema-blend.

Walk (Legend3D ver., 2015) and *Pirates of the Caribbean: Dead Men Tell No Tales* (Legend3D and Prime Focus cr., 2017). But at the same time, he criticizes many of the categories in terms of inception or execution. Sandrew is self-aware about his selective attention to positive reviews, and he notes that "all of the stereographers" will "post it on our Facebook or Twitter when it's positive."[33] Despite his critiques about the column's technical imprecision, Sandrew acknowledges that while critics and audiences might not fully understand how 3D works, their articulations of personal experience are still valuable: "People don't know what they're looking at, but they know how it made them feel, and that's kind of the goal, is to make them feel like this is an immersive and interesting experience."[34] Similarly, DNEG's Ben Breckenridge says that although "some of the categories [are] kind of funny," *Cinema Blend* critics are some of "the only people reviewing the actual 3D portion of the film."[35] Indeed, any Google search concerning whether one should see a film in 3D or not will inevitably lead to a *Cinema Blend* "To 3D or Not to 3D." Thus, close readings of these columns offer valuable insight into popular ideas of what makes a 3D parallel text successful.

Although I am critical of *Cinema Blend*'s approach throughout this section, I do not simply reject these 3D reviews as patently false or somehow ill-intended. Rather, I analyze this column as a case study in how moviegoers and critics have rationalized the relationship between 2D and 3D versions of movies. Anecdotally, as someone who has been watching and researching 3D movies for years, I have been repeatedly asked for my opinions about whether a given film was worth seeing in 3D or not (although this has happened much less frequently in recent years).

[33] Jared Sandrew, in interview by the author, Burbank, California, May 16, 2019.

[34] Jared Sandrew, in interview by the author, May 16, 2019.

[35] Ben Breckenridge, in phone interview by the author, June 18, 2019.

In a sense, *Cinema Blend* identified and then attempted to meet moviegoers' demand for advice on which version of a film to see. On a sociocultural level, I see the column as a self-taught framework for moviegoers/critics to make sense of a "new" technological format to themselves and to fellow audiences. Thus, in the process of developing recommendations about consumer choice, the *Cinema Blend* writers have produced aspirational expressions of DIY technical expertise, at once simplified and pragmatic.

Fit Score + Planning & Effort

Taken together, first two categories of *Cinema Blend*'s rubric reinforce long-standing misconceptions of 3D as best for action films and as director-driven, limiting our understanding of what 3D can be and who authors 3D. The first category "fit score" offers insight into whether 3D technology is a good fit for the movie at hand. Notably, this section often conveys a specific, limited view of what types of films should be in 3D. Perhaps the most prevalent assumption is that 3D is best suited to studio blockbusters. Writing on *Captain America: The First Avenger* (Stereo D cr., 2011), Josh Tyler writes how 3D "technology works best on big, splashy, summer blockbusters."[36] Such assumptions recur throughout the columns, across films and authors. Katey Rich questions the 3D fit *The Avengers*, a blockbuster film but one with an emphasis on conversations and character development. While this might work to the film's aesthetic credibility overall, "all the things that make *The Avengers* a smart, well-made movie also keep it from quite being the giant spectacle that demands you slap on the 3D glasses."[37] Both Tyler and

[36] Josh Tyler, "To 3D Or Not To 3D: Choose The Right Captain America Ticket," *Cinema Blend*, July 21, 2011, http://www.cinemablend.com/new/To-3D-Or-Not-To-3D-Choose-The-Right-Captain-America-Ticket-25796.html.

[37] Katey Rich, "To 3D Or Not To 3D: Buy The Right Avengers Ticket," *Cinema Blend*, April 27, 2012, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Avengers-Ticket-30660.html.

Rich assume that 3D works best with blockbuster action, and thus, dialogue-heavy drama seems like a waste of the third dimension. This reinforces the perceived binary between smart narrative and excessive spectacle, one discussed at length with reward to 3D in Chapter 1. Further, these comments assessing a film's 3D fit score highlight the understanding of a 3D conversion as a parallel text, one in which the film's own qualities can work against its use of 3D. To paraphrase Rich, *The Avengers* is an exceptional blockbuster because it focuses on character, but *The Avengers* 3D is a lesser experience because it focuses on character.

As common as it is to associate 3D with action blockbusters, one can alternately argue that stereoscopic cinema and human perception actually suggest more character-driven drama as better for 3D. In a *PopMatter* online feature, I argue that that while action flicks make up the vast majority of 3D features released by the major studios, 3D arguably works better with more intimate scenes.[38] Such scenes would better approximate how stereoscopic perception works in real life, with humans only able to perceive objects and people within 20 feet of us in stereo depth. Further, I draw on Matthias Stork's conception of "chaos cinema" to argue that contemporary action aesthetics tend to obscure rather than clarify spatial relations, making it problematic for 3D.[39] I do not intend here to suggest that this perspective on 3D is somehow more accurate, but rather to emphasize the rationalizations of *Cinema Blend* and, by extension, potential 3D moviegoers as cultural positions shaped by popular discourses but far from absolute certainties. Although *Cinema Blend*'s 3D column positions itself as "unbiased," it ultimately relies on the "common sense" that 3D and action go hand-in-hand.

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[38] Todd Kushigemachi, "Why Should Filmmakers and Critics Rethink 3D?," *PopMatters*, November 11, 2013, https://www.popmatters.com/176134-filmmakers-and-critics-need-to-rethink-3d-2495711763.html.

[39] Matthias Stork, "Chaos Cinema Part 1," Vimeo video, 10:23, posted by matze, August 22, 2011, https://vimeo.com/28016047; Matthias Stork, "Chaos Cinema Part 2," Vimeo video, 8:09, posted by matze, August 22, 2011, https://vimeo.com/28016704; Matthias Stork, "3," Vimeo video, 14:43, posted by matze, April 23, 2012, https://vimeo.com/28016704.

The *Cinema Blend* categories judging "Fit" and "Planning & Effort" tend to overlap in their explanations, both drawing on specific conceptions of how 3D works. The second category of "planning and effort" analyzes whether the filmmakers put thought into a film as a 3D experience. In contrast to native 3D purists, the columnists do not reject 3D conversions outright. *Cinema Blend* acknowledges that planning and effort can go into 3D conversions, but their columns typically focus on directors, not the 3D conversion companies or stereographers, and still occasionally suggest that native 3D is still better. That is, the column sometimes suggests that although 3D in conversions can be "planned," native 3D is *more* planned.

Even if *Cinema Blend* recognizes that filmmakers can creatively use 3D conversion in the service of a film, they typically attribute the intentionality to the director. Writing about *Mission: Impossible – Fallout* (Prime Focus cr., 2017), *Cinema Blend*'s Mike Reyes says, "When your director posts a picture of 3D goggles on his Instagram during the final phases of locking down his picture, you know he means business."[40] Josh Tyler opens his planning and effort analysis for *Captain America: The First Avenger* with "the bad news," that the film was not shot in 3D.[41] However, he ultimately gives the film a score of 4 out of 5 for planning because "Director Joe Johnston chose to shoot in 2D on purpose and, knowing that it would eventually be converted to 3D, planned his movie with that in mind."[42] Although Tyler acknowledges that directors often know their film will be converted into 3D and can thus plan ahead, the emphasis on directors

[40] The June 28, 2018, Instagram post referenced was still available as of August 27, 2019. To be fair, Reyes goes on to acknowledge "the team behind the 3D conversion of this film," but only as a parenthetical and in a review with no motion of 3D conversion company Prime Focus. Mike Reyes, "To 3D Or Not To 3D: Buy The Right Mission: Impossible - Fallout Ticket," *Cinema Blend*, July 27, 2018, https://www.cinemablend.com/news/2454659/to-3d-or-not-to-3d-buy-the-right-mission-impossible---fallout-ticket.

[41] Tyler, "To 3D Or Not To 3D: Choose The Right Captain America Ticket."

[42] Tyler, "To 3D Or Not To 3D: Choose The Right Captain America Ticket."

reifies the notion of a singular vision in a manner that effectively erases the creative labor of the 3D conversion companies.

Tyler's language regarding *The First Avenger* evinces possible knowledge of the thinking during the production process, but other reviews indicate that the writer has speculated about the 3D according to the film's formal design. Writing about *Captain America: The Winter Soldier* (Stereo D cr., Gener8 uncr., 2014), Sean O'Connell says "it didn't appear that the Russos thought that often about 3D when coming up with their action sequences."[43] He elaborates that the "claustrophobic nature of the combat doesn't always lend itself to 3D."[44] Rather than drawing on reporting or research, O'Connell appears to be making an educated guess about directors Anthony and Joe Russo to arrive at a score of 3 out of 5. In other words, this column effectively compares the parallel 2D and 3D versions of *The Winter Soldier* to make an argument concerning how much the filmmakers planned their production process in preparation for 3D conversion.

The *Cinema Blend* writers analyze film form and even production credits to infer what directors and filmmakers were thinking prior to and during the shooting phase of production. For *Edge of Tomorrow* (Prime Focus ver., 2014), Sean O'Connell writes, "Knowing that they were going to take full advantage of both 3D and the scope of an IMAX screen, Doug Liman and his [team] take breathless risks with camera placements to place us inside each and every action scene in the film."[45] Although it seems unlikely based on the column's history that *Cinema Blend*

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[43] Sean O'Connell, "To 3D Or Not To 3D: Buy The Right Captain America: The Winter Soldier Ticket," *Cinema Blend*, April 3, 2014, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Captain-America-Winter-Soldier-Ticket-42391.html.

[44] O'Connell, "To 3D Or Not To 3D: Buy The Right Captain America: The Winter Soldier Ticket."

[45] Sean O'Connell, "To 3D Or Not To 3D: Buy The Right Edge Of Tomorrow Ticket," *Cinema Blend*, June 5, 2014, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Edge-Tomorrow-Ticket-43332.html.

spoke with production personnel, this quote confidently asserts directorial intent in relation to 3D and the large screen format IMAX. The author appears to make his conclusion based on film form, specifically "camera placement," and the sense of immersion he felt as he watched the film. At other times, the reviewers make their guesses about 3D planning based on whether the key creatives had prior experience working in stereo. For the review of *Maleficent* (Gener8, Prime Focus, and Legend3D cr., 2014), Kristy Puchko discusses how cinematographer Dean Semler "has no eye-catching 3D titles to his credit," and similarly, while director Robert Stromberg has worked on 3D films, "he did so as a production designer. So we have no reason to assume he has experience with the intricacies of shooting for this device."[46] Indeed, given that they might not always have the time or access to actually interview those involved in the production process, the *Cinema Blend* writers develop creative strategies for making inferences about the mental states of the filmmakers.

Jared Sandrew's experiences support my conclusion that *Cinema Blend* largely guesses about planning and effort based on the design of the 2D filmmaking. Sandrew says that when columnists say directors thought about the stereo, "They're always wrong … They don't know. It's a guess. It'd be nice if they actually contacted us."[47] Further, while the column often speculates about planning for 3D before and during the shooting phase, Sandrew emphasizes that in his experience, the stereoscopic supervisor and 3D conversion companies are "translating the vision of the director and the filmmakers into stereo," largely because the 3D professionals are typically not involved with projects until after there is already a cinematographer, a director, and

[46] Kristy Puchko, "To 3D Or Not To 3D: Buy The Right Maleficent Ticket," *Cinema Blend*, May 29, 2014, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Maleficent-Ticket-43217.html.

[47] Jared Sandrew, in interview by the author, May 16, 2019.

visual effects supervisor.[48] Thus, an alternative 3D planning score might think less about pre-production and focus instead on either planning by the stereographers as they approach a conversion, or the level of collaboration with the director during the conversion process.

Ultimately, the first two categories in *Cinema Blend*'s "To 3D or Not to 3D" reveal that the reviewers largely draw on popular ideas of 3D-as-spectacle and director-as-author, often in ways that mystify the actual workings of 3D and 3D conversion companies. If "Fit Score" and "Planning & Effort" largely rely on speculative, qualitive analysis, the next two categories evaluate the mise en scene before and beyond the window, or theatrical screen, in a more *quantitative* manner. Still, the next two categories still rely on the popular understanding of 3D as spectacle.

Before/Beyond the Window

The next two criteria in *Cinema Blend*'s column are so deeply related that the order in which the two were presented changed over the course of the column's history. The "Beyond the Window" category refers to a film's use of positive parallax, when a viewer perceives objects to be behind the movie screen. By contrast, the "Before the Window" category refers to the use of negative parallax, when a viewer perceives an object as jumping out of the screen into theater space. Until around October 2011, *Cinema Blend* would first analyze depth behind the screen and then move on to depth in front of the screen.[49] However, with Martin Scorsese's *Hugo*, the column switched the order of these two categories, suggesting the way in which the two are

[48] Jared Sandrew, in interview by the author, May 16, 2019.

[49] Josh Tyler, "To 3D Or Not To 3D: Choose The Right Thor Ticket," *Cinema Blend*, May 4, 2011, https://www.cinemablend.com/new/3D-Or-3D-Choose-Right-Thor-Ticket-24538.html; Eric Eisenberg, "To 3D Or Not To 3D: Buy The Right Puss In Boots Ticket," *Cinema Blend*, October 28, 2011, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Puss-Boots-Ticket-27600.html.

essentially two sides of the same coin (or screen).[50] In essence, both of these categories are asking, how much 3D is there? Similar to *Cinema Blend*'s frequent linking of action cinema and stereoscopic 3D, the tendency to evaluate emergence effects with regard to quantity further reinforces the understanding of digital 3D as spectacle and excess. By contrast, the specific language used in analyzing depth beyond the screen resonate with popular understandings of digital 3D as enabling a greater sense of realism and immersion. Thus, these binaristic categories frame stereoscopic cinema as a medium of two extremes with differing cultural connotations that are seemingly at odds with each other.

As discussed in Chapter 1, the popular association of 3D with emergence from the screen has been, at once, part of the medium's appeal and a possible hinderance to its cultural legitimacy. Writing on 1950s 3D, William Paul suggests that stereoscopic cinema failed in the classical era because 3D was defined by an "aesthetics of emergence" that conflicted with the Hollywood system's norms of invisible storytelling.[51] Ariel Rogers argues how, by contrast, contemporary 3D has largely sought to focus on the pleasures of immersion historically associated with widescreen, not 3D, technologies.[52] This historical shift can be explained by contemporary filmmakers moving away from flying objects and the negative cultural connotations of such techniques. Barbara Klinger notes that that emergence today "seems like an outdated and opportunistic reversion to a by-now campy—an amusingly artificial and

[50] Katey Rich, "To 3D Or Not To 3D: Buy The Right Hugo Ticket," *Cinema Blend*, November 22, 2011, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Hugo-Ticket-28023.html.

[51] William Paul, "The Aesthetics of Emergence," *Film History* 5, no. 3 (1993): 321-355.

[52] Rogers, *Cinematic Appeals*, 199, 210.

exaggerated—cinematic past."[53] In response, "some respected directors have shunned the more obvious manifestations of negative parallax to avoid associating their work with a tactic of such ill repute."[54] Thus, by featuring categories for depth both "Before the Window" and "Beyond the Window," *Cinema Blend* effectively participates in a larger conversation about what 3D is, and how much 3D is the right amount of 3D.

Given this larger cultural context denigrating emergence effects, *Cinema Blend*'s "Before the Window" puts films in a bind, as 3D emergence simultaneously boosts the film's status as a "3D film" but might complicate its status as legitimate cinema. More specifically, objects popping out of the screen potentially mark a film as gimmicky and excessive for some viewers. In fact, when *Cinema Blend* initiated its column to coincide with the release of *Clash of Titans* in April 2010, the category measuring before-the-window depth was actually entitled "Gimmick Me!."[55] The column acknowledges the difficulty of this measurement amidst the general aesthetic shift to depth behind the screen, with most 3D movies "moving away from the gimmicky method of tossing everything at the screen to pop out at you."[56] The continuation of this category as assessed by the *Cinema Blend* team sets 3D movies up for a self-fulfilling prophecy of disappointment, asking the films for something that some audiences and critics actively reject. Thus, for some, a low score in this category might actually work to a film's advantage as a stereoscopic experience. Katey Rich writes, "while *The Avengers* is a really,

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[53] Barbara Klinger, "Beyond Cheap Thrills: 3D Cinema Today, the Parallax Debates, and the Pop-Out," in "3D Cinema and Beyond," ed. Dan Adler, Janine Marchessault, and Sanja Obradovic, Special Issue, *Public* 47 (2013): 188.

[54] Klinger, "Beyond Cheap Thrills," in "3D Cinema and Beyond."

[55] Josh Tyler, "To 3D Or Not To 3D: A Guide for Buying the Right Clash of the Titans Ticket," *Cinema Blend*, April 1, 2010, http://www.cinemablend.com/new/To-3D-Or-Not-To-3D-A-Guide-To-Buying-The-Right-Clash-Of-The-Titans-Ticket-17882.html.

[56] Rich, "To 3D Or Not To 3D: Buy The Right Hugo Ticket."

really fun movie, it also wants you to take it seriously, so Whedon and his 3D team take it pretty easy on the pop-out effects."[57] This comment strategically reassures readers that the film is fun, but not in the way that viewers might associate with the emergence effects of 3D.

Given the strategic move away from emergence effects, it is unsurprising that *Cinema Blend* marks down many movies in the digital 3D era for a lack of depth "Before the Window." For *Harry Potter and the Deathly Hallows: Part 2* (Prime Focus; Pixel Magic; Sassoon Film Design; Animal Logic; ICO VFX, LLC; Gener8; and I.E. Effects cr.; 2011), Eric Eisenberg suggests that there are "one or two moments - not scenes, mind you - that have bits and specs fly into the theater, but it's not nearly enough to make the movie a worthwhile 3D experience."[58] This critique suggests quantity to be the main criterion under consideration, and for Eisenberg, there is simply not enough 3D to justify the surcharge. Similarly, Sean O'Connell calls *Captain America: The Winter Soldier* a "missed opportunity" for negative parallax, "nary a flying shield or the wing of a S.H.I.E.L.D. helicarrier jet pokes off of the screen and into the audience."[59] Here, the writer speculates on what particular elements could have been brought into the theater space but remained largely at or beyond the screen plane.

Even as *Cinema Blend* strives for objectivity in its evaluations, contexts such as genre, franchise film style, and the native-versus-converted debate shape the expectations for the *Cinema Blend* writers as they await objects to come their direction.[60] Part of what made *Harry*

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[57] Rich, "To 3D Or Not To 3D: Buy The Right Avengers Ticket."

[58] Eric Eisenberg, "To 3D Or Not To 3D: Buy The Right Harry Potter And The Deathly Hallows Part 2 Ticket," *Cinema Blend*, July 13, 2011, https://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Harry-Potter-Deathly-Hallows-Part-2-Ticket-25667.html.

[59] O'Connell, "To 3D Or Not To 3D: Buy The Right Captain America: The Winter Soldier Ticket."

[60] For a consideration of genre in a research study about stereoscopic 3D by psychologists, see A.M. Baranowski, K. Keller, J. Neumann, and H. Hecht, "Genre-dependent effects of 3D film on presence, motion sickness, and protagonist perception," Displays 44 (2016): 53-59.

Potter so disappointing is that "given that the franchise has always featured a great deal of flashy projectiles, it could have been a slam dunk if the film had actually been planned in 3D."[61] Although no Harry Potter film had been fully released in 3D before this franchise finale, Eisenberg established expectations based on the earlier entries in the series, hopes that the conversion did not meet. Critics similarly have high expectations when approaching films shot in 3D, suggesting the way in which conversations about 3D production methods affects the perception of stereo quality and quantity. Director Marc Webb shot *The Amazing Spider-Man* (2012) using 3D cameras, but after suggesting negative parallax is "the part of 3D that native, shot-in-3D films usually tackle the best," Katey Rich rated the film 1/5 rating on this in-your-face technique.[62] In my opinion, this connection between native 3D and negative parallax does not necessarily follow. Both native and converted 3D are equally equipped to produce the illusion of negative parallax, unless one assumes native 3D is inherently better planned in 3D and thus more likely to include objects flying out in space. However, it is still significant to highlight how perceptions about 3D technologies can shape expectations for the quantity of emergence in 3D films.

My analysis here emphasizes how even quantitative analyses of 3D can be influenced by broader cultural conversations about 3D filmmaking. Notably, the column's "Before the Window" sections generally focus only on obvious coming-at-you moments, not all forms of depth before the window. Thus, this section might be said to more accurately assess when emergence effects are coupled with frontal address or something that can be construed as breaking the fourth wall. In a theater, it can be difficult to assess where exactly the screen or

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[61] Eisenberg, "To 3D Or Not To 3D: Buy The Right Harry Potter And The Deathly Hallows Part 2 Ticket."

[62] Katey Rich, "To 3D Or Not To 3D: Buy The Right Amazing Spider-Man Ticket," *Cinema Blend*, July 2, 2012, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Amazing-Spider-Man-Ticket-31690.html.

"window" actually is, as the modulation of depth often occurs in very subtle ways. For example, when mere mortals attempt to remove the hammer Mjolnor from a crater in the ground in the first installment of *Thor*, the film sets the action in front of the screen plane, or before the window. I am often only able to surmise such a subtler use of negative parallax with the benefit of viewing at home on a 3D television.[63] Further, while *Cinema Blend* was not particularly impressed with the *Deathly Hallows*, as indicated above, Barbara Klinger finds one of the few moments significant enough to warrant close analysis and a frame grab in her study of negative parallax.[64] Given that Klinger focuses on a notable instance of negative parallax at the film's climax, one can imagine an alternate conception of *Cinema Blend*'s "before-the-window" measurement that focuses less on quantity and more on the narrative salience of the moments that do occur. These other possible ways of evaluating 3D emergence highlight the importance of specific cultural perspectives when assessing the value of stereoscopic cinema.

When analyzing depth "Beyond the Window," *Cinema Blend* pivots from 3D as fourth wall-breaking spectacle to 3D as immersive and realistic experience. For this category, *Cinema Blend* repeatedly analyzes not simply the use of stereoscopic depth cues but also whether the mise en scene or production design conveys a rich world behind the screen. When critics and viewers talk about this element, they sometimes echo Andre Bazin, striving for the sense of realism that the French theorist found in deep-focus photography. Bazin famously wrote about

[63] For 3D televisions, smart remotes are incredibly useful tools for analyzing 3D film form. Positive parallax, depth beyond the window, occurs when the image designed for the left eye actually appears on the screen to the left of the image for the right eye. Conversely, negative parallax, depth before the window, requires the eye image for the left eye to appear to the *right* of the right-eye image. Thus, the two images for a figure at the plane of the theater/television screen appear to overlap. A smart remote uses a cursor akin to that of a mouse pointer on a computer screen, so if I move this around the screen, it will appear to be floating in the space of the film at the precise plane of the screen. This helps make explicit what is generally only felt by the viewer on a more subconscious level.

[64] Eisenberg, "To 3D Or Not To 3D: Buy The Right Harry Potter And The Deathly Hallows Part 2 Ticket."

how the depth of field in the films of Orson Welles and William Wyler "[bring] the spectator in closer relation with the image than he is with the reality."[65] Further, he argued that such visual construction gave the audience more agency in reading the space: "It is no longer the editing that selects what we see, thus giving it an *a priori* significance, it is the mind of the spectator which is forced to discern … the dramatic spectrum proper to the scene."[66] Miriam Ross has explicitly considered 3D in relation to the aesthetics favored by Bazin, writing that "stereoscopy offers a particular incentive to return to a deep-focus filmmaking style."[67] Along these lines, *Cinema Blend* looks for deep staging in clear, stereoscopic depth when analyzing 3D beyond the window.

The Bazinian connection becomes especially explicit when *Cinema Blend* columns discuss whether or not the backgrounds in 3D films are in focus. For *X-Men: Days of Future Past* (native 3D + Stereo D cr., 2014), Kristy Puchko critically mentions that the "settings are often cloaked in shadows, fog, hazy sunshine, or are just out of focus," effectively undercutting "the depth of field 3D would provide."[68] Here, the writer suggests that stereoscopic depth cues would be best served by a visual style that allows the viewer to clearly see the objects beyond the screen plane. Reviewing the stereo in Disney's live-action *Sleeping Beauty* retelling *Maleficent*,

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[65] Alternately, David Bordwell frames *Citizen Kane* (1941) as an "eccentric extreme" in terms of deep staging and deep focus, so he instead presents an alternate history that considers depth staging in early cinema. André Bazin, "The Evolution of the Language of Cinema" in *What Is Cinema? Volume I*, trans. Hugh Gray (Berkeley: University of California Press, 1967), 35; David Bordwell, *The History of Film Style* (Cambridge: Harvard University Press, 1997), 158-174.

[66] André Bazin, "An Aesthetic of Reality: Neorealism," in *What Is Cinema? Volume II*, trans. Hugh Gray (Berkeley: University of California Press, 1971), 28.

[67] Jesko Jockenhövel cites Bazin in his essay identifying two main characteristics of 3D long shots: "worldbuilding and acting as an interface for our phenomenological sensory experience." Miriam Ross, *3D Cinema: Optical Illusions and Tactile Experiences* (London: Palgrave Macmillan, 2015), 108; Jesko Jockenhövel, "A Three-Dimensional Checkerboard: The Long Take in 3D Films," in *The Aesthetic and Narrative Dimensions of 3D-Film*, ed. Markus Spöher (Berlin: Springer VS, 2016), 55-70.

[68] Kristy Puchko, "To 3D Or Not To 3D: Buy The Right X-Men: Days Of Future Past Ticket," *Cinema Blend*, May 22, 2014, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-X-Men-Days-Future-Past-Ticket-43114.html.

Puchko describes the possibilities of positive parallax by referring to "3D's ability to enhance the depth of field."[69] It might have been more precise to say that 3D benefits from depth-of-field or that deep focus can enrich 3D photography, but regardless, the strong connection between clarity and depth suggests that, intentionally or not, critics echo theories of cinematic realism in their assessments of 3D.

"Beyond the window" requires references not only to cinematographic depth of field but also to mise en scene, including staging and design. Katey Rich writes that in the animated *The Adventures of Tintin* (2011), director Steven Spielberg "uses the 3D to be able to set up multiple planes of activity, so you can keep an eye on Tintin in the foreground while the bad guys come zooming up behind him."[70] The reference to "multiple planes" emphasizes the interrelation between cinematography and mise en scene in deep-focus cinema, and this logic suggests that directors should clearly think through the space in terms of foreground, middle ground, and background. Often, the *Cinema Blend* critics praise fantastical production design and visual effects that render the individual planes themselves spectacular. Rich praises the live-action prequel/reboot *Oz the Great and Powerful* (native 3D + Legend3D ver., 2013) for the viewer's sense of settings "from the expansive Emerald City to the figures just a bit further away in the magical fog that Glinda summons."[71] The *Maleficent* reviews describes "flowing landscapes of forests and thorns, its grand castles with deep halls, and battlefields studded by soldiers."[72] DreamWorks Animation's *How to Train Your Dragon 2* (2014) takes us "from the bustling, hut-

[69] Puchko, "To 3D Or Not To 3D: Buy The Right Maleficent Ticket."

[70] Katey Rich, "To 3D Or Not To 3D: Buy The Right Adventures Of Tintin Ticket," *Cinema Blend*, December 23, 2011, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Adventures-Tintin-Ticket-28513.html.

[71] Katey Rich, "To 3D Or Not To 3D: Buy The Right Oz The Great And Powerful Ticket," *Cinema Blend*, March 8, 2013, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-Oz-Great-Powerful-Ticket-36259.html.

[72] Puchko, "To 3D Or Not To 3D: Buy The Right Maleficent Ticket."

studded, dragon-laced land of Berk to an expansive sea, cut with towering icy spikes, and finally caves with dark corners and a glittery dragon's nest alive with color and motion."[73] As these examples indicate, *Cinema Blend* repeatedly describes the litany of fantastical settings in feature films to talk not just about the 3D itself but about the visual worlds the 3D allows the viewer to inhabit.

Ultimately, beyond-the-window 3D, when matched with the right depth of field, staging, visual effects, and design, allows the audience to be immersed in the world of the film. Scored 5/5 for depth beyond the window, *Cars 2* (2011) demonstrates that "Pixar really goes out of their way to make the movie feel as immersive as possible in 3D."[74] Similarly, Disney's in-house conversion of *The Lion King* (2011) does not have a "single moment … that doesn't make you feel like you can hop into the screen and run for miles in any direction."[75] For the fight sequences in *The Avengers*, the 3D "really does help you place yourself within this world, and feel all the more absorbed in it."[76] Repeatedly, *Cinema Blend*'s writers suggest that the greater sense of depth offered by the stereoscopic illusion, used correctly, allows the viewer to enter the worlds of the films.

The concept of immersion that recurs in *Cinema Blend* also appears in scholarly accounts about stereoscopic cinema. Olivier Asselin and Louis Auger Gosselin suggest that "immersion has always been a primary goal in all research and development programs" for technology "and a

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[73] Kristy Puchko, "To 3D Or Not To 3D: Buy The Right How To Train Your Dragon 2 Ticket," *Cinema Blend*, June 12, 2014, http://www.cinemablend.com/new/3D-Or-3D-Buy-Right-How-Train-Your-Dragon-2-Ticket-43403.html.

[74] Josh Tyler, "To 3D Or Not To 3D: A Guide To Choosing The Right Cars 2 Ticket," *Cinema Blend*, June 22, 2011, https://www.cinemablend.com/new/3D-Or-3D-Guide-Choosing-Right-Cars-2-Ticket-25352.html.

[75] Eric Eisenberg, "To 3D Or Not To 3D: Choose The Right Lion King 3D Ticket," *Cinema Blend*, September 15, 2011, http://www.cinemablend.com/new/To-3D-Or-Not-To-3D-Choose-The-Right-Lion-King-3D-Ticket-26805.html.

[76] Rich, "To 3D Or Not To 3D: Buy The Right Avengers Ticket."

key factor in the buying patterns of consumers."[77] 3D cinema, they suggest, is "naturally part of this immersive program," as it "gives the image more depth."[78] Writing on 3D IMAX, Alison Griffiths has characterized the viewer as feeling "enveloped in immersive spaces and strangely affected by a strong sense of the otherness of the virtual world one has entered."[79] Miriam Ross writes that "the abundance of depth planes" in 3D films "[provoke] an immersive effect, distinct from narrative immersion, through which the viewer's body is located within and in relation to, rather than separated from, the film."[80] To an extent, the scholarship on 3D employs a rhetoric of immersion similar to that found in popular, mainstream journalism.

Despite the popularity of the immersion trope, scholars carefully note stereoscopic 3D's contradictions, as embodied by the perceived binary between depth "Before the Window" and "Beyond the Window." Asselin and Gosselin write that in addition to offering depth, 3D cinema also offers "more relief" and thus it potentially "aims at emersion rather than immersion."[81] Ross qualifies her statement of 3D's immersive potential, commenting how stereoscopy can also "combine with the visual field in order to produce spectacle that foregrounds itself."[82] Ross and other scholars are clearly influenced by the influential work of Tom Gunning, whose conception of a Cinema of Attractions problematizes a narrative-driven historiography that assumes the

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[77] Olivier Asselin and Louis Auger Gosslin, "This Side of Paradise: Immersion and Emersion in S3D and AR," in "3D Cinema and Beyond," ed. Dan Adler, Janine Marchessault, and Sanja Obradovic, Special Issue, *Public* 47 (2013): 132.

[78] Asselin and Gosslin, "This Side of Paradise," 132.

[79] Alison Griffiths, *Shivers Down Your Spine: Cinema, Museums, and the Immersive View* (New York: Columbia University Press, 2008), 3.

[80] Ross, *3D Cinema*, 20.

[81] Asselin and Gosslin, "This Side of Paradise," 132.

[82] Ross, *3D Cinema*, 55.

complete immersion of the audience into a film.[83] Philip Sandifer voices the strongest skepticism of the immersive discourse, suggesting that "to marvel at an immersive experience is necessarily to not be immersed."[84] Ultimately, Sandifer concludes that 3D cinema "illustrate[s] the gap that occurs between the first step—creating allure—and the second step, which is to create a rhetoric for future use of the technology."[85] In essence, he reduces cinema to the emergence effect, one that is not sustainable as a medium of narrative storytelling.

Ultimately, despite *Cinema Blend*'s cultural perspectives that hinder its self-purported objectivity, as well as the occasional technical imprecision, *Cinema Blend*'s approaches to depth "Before the Window" and "Beyond the Window" exemplify the existential debate over stereoscopic cinema in layman's terms. Still, the column's reliance on tropes about 3D cinema often misrepresents or elides the actual creative labor of 3D conversion. (Although there is not enough room here to explore all in detail, the other categories in the column also emphasize quantity as the most significant measure of the 3D's worth.[86]) Thus, the rest of this chapter is dedicated to exploring the work of practitioners at 2D-to-3D conversion companies and how they make sense of their technical and artistic processes. I do not juxtapose *Cinema Blend*'s columns

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[83] Tom Gunning, "The Cinema of Attraction[s]: Early Film, Its Spectator and the Avant-Garde," in *The Cinema of Attractions Reloaded*, ed. Wanda Strauven (Amsterdam: Amsterdam University Press, 2006), 381-388.

[84] Philip Sandifer, "Out of the Screen and into the Theater: 3-D Film as Demo," *Cinema Journal* 50, no. 3 (Spring 2011): 64.

[85] Sandifer, "Out of the Screen and into the Theater," 77.

[86] *Cinema Blend*'s brightness score suggests that the quantity of light in a film's mise en scene can counter the potential dimness of 3D projection: "Smart filmmakers typically compensate for [dimness] by making their films brighter and more colorful." The column's "Glasses Off" test suggests that the amount of blur you see without the glasses indicates whether there is enough 3D or not: "Typically the more blurry [sic] the picture is, the better 3D you're supposed to be getting." Finally, the "Audience Health" score suggests that too much 3D and/or camera movement can cause audience members to become physically sick. One film with a 1/5 score here yielded this explanation: "The collision of the cinematography and 3D had created a dull ache behind my eyes that developed into a dizzying headache by movie's end." Clearly, these three final categories are primarily concerned with issues of quantity, often in ways that echo analysis for the preceding criteria. Rich, "To 3D Or Not To 3D: Buy The Right Adventures Of Tintin Ticket"; Reyes, "To 3D Or Not To 3D: Buy The Right Mission: Impossible - Fallout Ticket"; Puchko, "To 3D Or Not To 3D: Buy The Right X-Men: Days Of Future Past Ticket."

and my interviews with practitioners to condemn the former but rather to underline the complex relationship between how 3D is produced and how 3D is received. Put another way, both of these perspectives suggest two different frameworks for understanding how to effectively produce a parallel 3D text for a 2D film: one a more consumer-focused assessment of added value, and the other a more qualitative theorization of how to negotiate 2D and 3D aesthetics.

Implications for Labor: Conversion as Concurrent and Collaborative

The *Cinema Blend* column demonstrates a popular understanding of 3D conversions as parallel texts, deeply connected to 2D "originals" but requiring unique aesthetic and experiential considerations. However, as I have suggested, the *Cinema Blend* writers only incidentally explore the labor necessary to create these parallel texts.[87] Similar to how the 2D and 3D versions of contemporary films are released simultaneously, the two texts are crafted concurrently and collaboratively. In a parallel labor process, the 3D companies convert the films alongside 2D production and post-production. In some cases, this simultaneity allows the companies to collaborate with directors to coordinate an artistic vision across the two parallel texts. To explain and legitimize their creative work, in popular press and in my interviews, conversion company professionals have often emphasized their working relationships with directors and other 2D filmmakers, repositioning 3D as an extension, not a desecration, of an

[87] *Cinema Blend*'s critics are far from exceptional for their elision of below-the-line labor. As I have mentioned elsewhere, critics have long looked to the director as a singular voice for the film, perhaps most famously exemplified by Andrew Sarris's auteurist criticism. In part, this device might be practical, given the restrictions on the length of film reviews especially in print journalism. On a deeper level, this tendency taps into what Foucault has referred to as the "author-function." Andrew Sarris, *The American Cinema: Directors and Directions 1929-1968* (New York: E.P. Dutton & Co., Inc., 1968); Michel Foucault, "What Is an Author?," in *Rethinking Popular Culture: Contemporary Perspectives in Cultural Studies*, ed. Chandra Mukerji and Michael Schudson (Berkeley: University of California Press, 1991), 446-464.

artistic vision. As in Chapter 1, I largely draw from Prime Focus's now-defunct, project-specific web pages that detail and narrativize their creative process.

The practical challenges of the concurrent conversion of contemporary 2D blockbusters into 3D became headline news early on in 3D conversion's history, specifically with the "failed" conversion of *Harry Potter and the Deathly Hallows – Part I* (Prime Focus ver., 2011).[88] On February 3, 2010, *Daily Variety* reported that Warner Bros. would convert the seventh installment of the Harry Potter film series into 3D.[89] But just eight months after the announcement, Warner Bros. cancelled the theatrical release of the 3D version. A *Daily Variety* report attributed the decision to "production problems": "A studio has drawn a line, preferring no 3D to bad 3D."[90] Although the already-completed 3D was reportedly of high quality, "the count of final shots had fallen well behind schedule."[91] For conversion skeptics, the fact that the conversion could not be completed in time supported the narrative that 3D was an afterthought, something that occurs *after* the completion of the text.

To avoid a similar public failure, 2D-to-3D conversion companies and studios have developed ways to make their processes more efficient, without sacrificing quality. Challenging the perception of a 3D conversion as purely *following* a 2D original, the 3D companies typically convert footage *during* the completion of the 2D film. Given the tight deadlines for converting films, 3D conversion companies work in parallel with visual effects to give themselves as much time to work as possible. For example, Scott Squires, who has worked with Legend3D, notes that

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[88] As noted in a previous footnote, although the seventh *Harry Potter* film was not released in a 3D version for its 2010 theatrical release, a 3D conversion was made available in Blu-ray 3D in 2011.

[89] David S. Cohen and Dave McNary, "WB's on 3D fast track," *Daily Variety*, February 3, 2010.

[90] David S. Cohen and Dave McNary, "Quality wins as WB nixes 3D on 'Potter'," *Daily Variety*, October 11, 2010.

[91] Cohen and McNary, "Quality wins as WB nixes 3D on 'Potter'."

like visual effects companies, 3D conversion workers face the challenge of "ever changing edits and creative decisions."[92] Additionally, because visual effects themselves change, stereo companies have to closely follow vfx changes "such that we [can] turn around the final converted shots within a day or two of deliver [sic] of the last vfx shots."[93] Working on *The Avengers*, Stereo D would begin roto and conversion on shots as long as principal photography and animation were finished, even if lighting still needed to be adjusted. This way, the 3D conversion workers could "drop in final shots over the top of the temp work, thus dramatically speeding up the pipeline and moving huge chunks of work earlier in the schedule."[94] By describing the details of their workflow, the companies emphasize how they balance efficiency and quality, and also problematize misconceptions of conversion as mere postscript in the filmmaking process.

Because conversion has become increasingly coincident with 2D production and post-production, the 3D companies can sometimes collaborate with the filmmakers to ensure that the stereo conversion remains true to the artistic vision of the 2D "original." When directors work with vendors to aide or guide the conversion, 3D companies inevitably highlight this relationship in their press materials. The Prime Focus webpage for *Men in Black 3* (cr., 2012) boasted how "director Barry Sonnenfeld and [Sony Pictures Imageworks' 3D Visual Effects Supervisor, Corey] Turner collaborated with Prime Focus World from the earliest stages of post-production to use the third dimension as a storytelling tool to further enhance the theatrical experience."[95]

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[92] Scott Squires, "2D to 3D Conversions," *Effects Corner* (blog), August 4, 2011, http://effectscorner.blogspot.com.au/2011/08/2d-to-3d-conversions.html

[93] Squires, "2D to 3D Conversions."

[94] Mike Seymour, "Art of Stereo Conversion: 2D to 3D – 2012," *fx guide*, May 8, 2012, http://www.fxguide.com/featured/art-of-stereo-conversion-2d-to-3d-2012/.

[95] Post for *Men in Black 3*, Prime Focus, accessed May 10, 2014, http://www.primefocusworld.com/men-in-black-3.

The mention of Sonnenfeld, a Hollywood veteran and director of first three films in the *Men in Black* series, relies on the popular notion of the director as the creative authority of any given film. While the name Sonnenfeld might not have the cultural cache of a Herzog or a Scorsese, filmmakers with acclaimed native 3D films, the mention of a director still works toward validating the 3D version of *Men in Black 3* as creatively legitimate. This particular quote also notes the timing of the collaboration, that Prime Focus was in conversation with the filmmakers in the "earliest stages of post-production." Again, references to the workflow of 3D conversion suggest the 3D versions to be more than last-minute additions. The company not only collaborates with the filmmakers, but they collaborate *early*.

Prime Focus competitors have also stressed their working relationships with directors. Stereo D highlights how for *The Avengers*, the company established a workflow that "allowed [director] Joss Whedon and his team to see every phase of the post work."[96] In the "Management" section of its now-defunct website, Gener8 emphasized how the company's stereoscopic supervisor Ben Breckenridge "works with film directors to set the creative vision for stereo films on both conversion and native 3D productions."[97] Elsewhere, the Gener8 website suggests that its process allows for "real-time adjustments of all stereoscopic parameters, which [help] directors more quickly realize their creative vision."[98] By looking to the director as a source of aesthetic credibility, companies such as Prime Focus, Stereo D, and Gener8 carefully negotiate their positions as vendors working for clients, on one hand, and as unique creative voices in their own right, on the other. They do not want to be seen as in excess of the film's

[96] Seymour, "Art of Stereo Conversion: 2D to 3D – 2012."

[97] Management, *Gener8*, accessed February 17, 2017, https://www.gener8.com/about/management/.

[98] Overview, *Gener8*, accessed February 17, 2017, https://www.gener8.com/about/overview/.

authorial intent. 3D conversion companies want to see their work as a part of and/or an extension of the director's voice. At the same time, to push too much on this point would also to deny their own artistic voice. As I noted in Chapter 1, 3D conversion companies are not unique in this regard, as this is a potential dilemma for any below-the-line craft, but in the case of 2D-to-3D conversion, this tension is exacerbated by the fact that one can still see these films without 3D.

This balancing act is evident in Prime Focus's careful characterization of its relationship with Tim Burton and visual effects artists for *Frankenweenie* (ver., 2012). On their website, Prime Focus said they were able to "work closely" with director Burton but "ultimately execute full creative control of the 3D conversion on the show."[99] Prime Focus wants to assure readers that their 3D conversion is consistent with the artistic vision of director Burton and his visual effects team, but they also want to claim the authorship of their unique creative work. This note of a director giving his blessing to a conversion while not necessarily being involved in the details of the creative process also appears in how Legend3D characterizes its relationship with director Tony Scott for their conversion of the 1986 film *Top Gun*, discussed at length in Chapter 2. According to Legend3D's Barry Sandrew, the director gave Legend3D complete creative control over the conversion process, but he reviewed each reel as they were completed in 3D.[100] Both Prime Focus and Legend3D characterize their work as the director's work and not the director's work, aligning themselves with the negotiated professional position of other below-the-line workers.

Although working with the director is ultimately ideal, 3D conversion companies will highlight any contact with any creative professional outside of their company walls, often

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[99] Post on *Frankenweenie*, Prime Focus, accessed May 11, 2014, http://www.primefocusworld.com/frankenweenie.

[100] Ian Failes, "Back into the danger zone: *Top Gun* 3D," *fx guide*, February 8, 2013, http://www.fxguide.com/featured/back-into-the-danger-zone-top-gun-3d/.

including stereographers. As briefly mentioned in Chapter 1, "Stereographer" can refer to individuals in leadership positions at the 2D-to-3D conversion companies but can also indicate either a studio employee or a third party aligned with the studio to serve as an intercessor between 2D production and 3D conversion. For *Wrath of the Titans* (Prime Focus cr., Gener8 uncr., 2012), "Studio Stereographer Marcus Alexander worked closely with Prime Focus' Senior Stereographer Richard Baker to develop the film's 3D look."[101] Although Prime Focus's webpage of the film did not directly cite directorial involvement, it instead highlighted the relationship with a studio stereographer as a legitimating force. Further, the same studio stereographers and 3D conversion companies will often collaborate on several projects over time, suggesting ongoing creative collaboration. In the post for Prime Focus's *Seventh Son* (cr., 2015), the company specifically notes that it had previously worked with Alexander on *Wrath of the Titans*.[102] While discussing *Pixels* (Prime Focus and Gener8 cr., 2015), Prime Focus's Ricky Aggarwal not only notes the two previous collaborations with Alexander but also says "it's always fun working with him."[103] By reemphasizing the collaborations over time and the pleasant nature of these exchanges, 2D-to-3D conversion vendors offer a narrative of a highly personal process, perhaps echoing how directors might work frequently with particular cinematographers or editors. The conversion company's relationship with studios and filmmakers is not one and done, they suggest, but the maturity of 3D conversion and its normalization in contemporary Hollywood as a creative process has paved the way for long-term creative relationships.

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[101] Post on *Wrath of the Titans*, Prime Focus, accessed May 10, 2014, http://www.primefocusworld.com/wrath-of-the-titans.

[102] Post on *Seventh Son*, Prime Focus, accessed February 20, 2015, http://www.primefocusworld.com/seventh-son.

[103] Post on *Pixels*, Prime Focus, accessed July 26, 2015, http://www.primefocusworld.com/pixels.

Whenever possible, Prime Focus highlighted the instances when their employees were on set during production to help the filmmakers consider the possibilities for 3D.[104] Prime Focus's Senior Stereo Supervisor Richard Baker was on set for *Maleficent*, and Baker says that "the intention was to design shots to make things easier during the conversion process…That can range from simple framing considerations, to the use of foreground elements that may be more effectively added in later, as stereo VFX elements."[105] However, if someone from Prime Focus could not be there, hopefully at least someone with knowledge of 3D could collaborate on set. For *Seventh Son*, Prime Focus's Ben Murray says that studio stereographer Marcus Alexander was "on-set during the production and involved in the design of the shots." Further, Alexander "provided a detailed depth script at the start of the project, which was a good starting point to take the stereo to the level we did at final."[106] Again, while the ideal scenario would be to have someone from Prime Focus on set, the company will still highlight the legitimatizing physical presence of a 3D expert on set, even when that expert was not their own.

Above, I have detailed instances where 2D-to-3D conversion companies have cited active collaboration with 2D filmmakers before, during, and/or after production to frame their creative

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[104] These instances of stereoscopic supervisors on set resonate with a long history of technical advisors for production, especially to facilitate the incorporation of new moviemaking technologies. Most famously, Natalie Kalmus and the Technicolor directors provided detailed guidance on how color should and should not be used when filming with that company's (rented) cameras. However, there are key differences between the Technicolor and 3D conversion examples. Most significantly, when a studio produced a film in Technicolor, it was not as an alternative to an existing black-and-white version (even if the film might be eventually broadcast in black-and-white on television). Thus, a Technicolor director was making recommendations for *the* movie. By contrast, a 3D skeptic could argue that the stereoscopic supervisor only consults on one (additional) version of the movie. David Bordwell, Janet Staiger, and Kristin Thompson, *The Classical Hollywood Cinema: Film Style & Mode of Production to 1960* (New York: Columbia University Press, 1985); Jason Gendler, "Are My Eyes Really Brown? The Aesthetics of Colorization in *Casablanca*" in *Color and the Moving Image: History, Theory, Aesthetics, Archive*, ed. Simon Brown, Sarah Street, and Liz Watkins (New York: Routledge, 2012), 202-203.

[105] Stereo D's Graham D. Clark explains, "For some films, we send our stereographers for the first couple of days of shooting on set to have those discussions [about artistic intention] with the director and the DP." Post on *Maleficent*, Prime Focus, accessed June 12, 2014, http://www.primefocusworld.com/maleficent; Celine Tricart, *3D Filmmaking: Techniques and Best Practices for Stereoscopic Filmmakers* (New York: Routledge, 2017), 87.

[106] Post on *Seventh Son*, Prime Focus, accessed February 20, 2015, http://www.primefocusworld.com/seventh-son.

labor as consistent with a singular artistic vision. However, 2D filmmakers participate in the 3D conversion process to varying degrees. As previously mentioned, Jared Sandrew says his Disney stereo team does not always have the opportunity to directly collaborate with the filmmakers in the early stages of planning.[107] Representing Legend3D in 2014, Sandrew said that if the 3D conversion vendor was not able to work with the filmmaker, the creative vision was "up to interpretation. Because you guys will all interpret the film the way that you want. We'd be doing the same."[108] This language echoes my conception of 3D conversion as a process of creative interpretation, one based on close reading and applications of the resulting conclusions. Indeed, a closer look at the sometimes-complicated workflow of 3D conversion further shifts the attention from a director's planning to the 3D conversion companies' interpretation of the 2D footage they receive. In essence, 3D conversion represents a contingent process that involves varying degrees of 2D filmmakers' involvement and/or independent encoding/decoding. The next section will primarily explore one question: If 3D conversion of contemporary films is still an interpretive process, what principles and theories do the professionals use to guide *how* they add stereoscopic 3D to a film?

2D-to-3D Conversion Professionals, Authorship, and Theory

As with the conversion of a classic 2D library title into 3D, the conversion of a contemporary film into 3D results in a parallel text, one nominally the same as its 2D counterpart but with its own unique formal properties. Thus, if the conversion company or stereoscopic supervisor's creativity agency primarily lies in how they decide to creatively interpret a 2D film

[107] Jared Sandrew, in interview by the author, May 16, 2019.

[108] 3DCreativeSummit, "Jared Sandrew of Legend3D On Man of Steel @3DCS 2014," YouTube video, 27:58, March 31, 2014, https://www.youtube.com/watch?v=Ds0P0XrRnMs.

and its director's vision into 3D, what are the potential approaches they can take to create the parallel text? This section will explore practical considerations and aesthetic theories that guide the work of 3D conversion experts when working on films for the simultaneous co-release of 2D and 3D versions. As John Thornton Caldwell has argued, practitioners actively hone their own theories about film and aesthetics that parallel the work of academic scholars.[109] My interviews with 3D veterans at companies such as DNEG, Legend3D, and Disney show how these practitioners negotiate a number of complex creative considerations in converting a film, whether that be balancing a company or franchise style with the vision of a particular director, or choosing to apply more realist or formalist conceptions of film style to their 3D.

It is important to reiterate that, as a parallel text, a 3D conversion has unique formal, namely the addition of depth in z-space as enabled by the creation of corresponding left- and right-eye images for each and every 2D frame. While the differences resulting from the stereoscopic depth cues might be subtle in many cases, the 3D conversion process sometimes results in more overt differences from the 2D version of the film. For example, studio stereo supervisors and 3D conversion companies occasionally remove or reposition elements in a shot if they prove too problematic for the 3D conversion. As Disney's Jared Sandrew explains, "We'll take out things in the 2D film that are overly distracting in the 3D film. If there's a foreground bar that we're supposed to be looking through, we'll take that out if it irks us too much or if it ruins the scale" (fig. 15).[110] Such an intervention emphasizes the 3D conversion's status as a

[109] I use the word "theory" here to draw out the parallels between the discourses of 3D conversion professionals and those of film theorists, but Caldwell qualifies how he uses (or does not use) this specific word: "I use the terms critical and theorizing *practices*—rather than the more singular and bounded term *theory*—to clarify that practitioners seldom reify this mode of generalizable self-inquiry into an autonomous discipline as academic theorists do." John Thornton Caldwell, *Production Culture: Industrial Reflexivity and Critical Practice in Film and Television* (Durham: Duke University Press, 2008); John Thornton Caldwell, "Critical Industrial Practice: Branding, Repurposing, and the Migratory Patterns of Industrial Texts," *Television & New Media* 7, no. 2 (May 2006): 108.

[110] Jared Sandrew, in interview by the author, May 16, 2019.

parallel text, with material changes from the 2D version to best suit the creative needs of the stereoscopic version.

Figure 15: On February 24, 2020, David F. Sandberg posted images on Twitter to explain aspects of the 3D conversion process for his film *Shazam!* (DNEG's Ben Breckenridge, stereoscopic supervisor). Sandberg's caption for this image: "Sometimes you get a background object covered up in one eye but visible in the other eye which gets uncomfortable. That was the case with the fire behind Sivana in this shot, so for 3D that fire was painted out to spare you the headache." Source: Sandberg, David F. Twitter Post. February 24, 2020, 8:51 p.m. https://twitter.com/ponysmasher/status/1232166122432057349.

Still, such dramatic changes are relatively rare, and most often, the 3D conversion company's creative decisions do not in turn affect the original 2D shots. Sandrew said his Disney team does its best to stick to the original as much as possible, only making changes when it is absolutely necessary: "Visual effects supervisors don't want us to ruin their visual effects. They've spent a lot of time working on this. There's been hundreds of iterations of this shot, and now I'm coming in and altering it? That doesn't fly."[111] Thus, similar to the process of converting a classic library movie, the conversion of a contemporary film for simultaneous 2D-

[111] Jared Sandrew, in interview by the author, May 16, 2019.

3D co-release requires a balance of respect for the integrity of the original 2D images the vendor receives, on one hand, and a creative directive to produce the best stereoscopic experience possible, on the other.

In previous section, I detailed the varying levels of explicit collaboration between 3D conversion companies and 2D filmmakers, and how professionals can discursively mobilize such partnerships to legitimize a 3D version of a film as consistent with an author's vision for the 2D film. But whatever the level of collaboration may be, the conversion of contemporary films into 3D requires practitioners to seriously engage with aesthetics and film form, as discussed at length with regard to library titles in Chapter 2. Just as *Top Gun* has filming and editing choices that present both challenges and opportunities for stereoscopic 3D, contemporary films converted into 3D contain formal elements that affect how the 3D might be applied to a given scene or shot. DNEG's Paul Becker recalls that the many whip pans in *Wonder Woman* (Gener8 cr., 2017) created a strobing effect that required the Gener8 team to "use a bit more motion blur then one would normally do."[112] In contrast, Becker believes that long takes in *Aquaman* (Gener8 cr., 2018) were especially conducive to 3D conversion, allowing viewers more time to register the depth of a given shot. Both of these examples reveal how Becker and his colleagues at DNEG/Gener8 approach these films with a serious consideration of aesthetics and form to conceptualize what will work particularly well in 3D and what might require some additional creative workarounds.

Echoing Becker's views on long takes, Disney's Jared Sandrew also sees film elements such as shot length and camera lens as crucial to how one implements 3D for a film. Sandrew mentions *Resident Evil: The Final Chapter* (Legend3D ver., 2017), a project on which he did not

[112] Paul Becker, in phone interview by the author, March 1, 2019.

work, as a film with rapid editing that would present specific creative challenges for 3D conversion. "Your shots are six frames long. When you're converting that, you can't look at an individual shot and judge it for scale. You really have to look at the sequence and judge it for, how does this play."[113] Sandrew says he would adjust his personal 3D aesthetic if he worked on a film with especially fast cutting, such as *Resident Evil*. (Later in this chapter, I will discuss Sandrew's creative approach to 3D in greater detail.) Similarly, Sandrew notes that in his job at Disney, he has not worked on films "where they've used mostly long lenses or lock-offs," the former an optical choice that would make it more difficult to build internal volume during conversion, and the latter a reference to stationary cameras.[114] Repeatedly, Sandrew makes reference to the way in which he negotiates his own personal approach to 3D with a careful accounting of the production and form of the 2D footage he converts.

Even though the cinematography or editing of the 2D footage can present challenges for conversion, the 3D companies do not typically tell filmmakers what they can or cannot do. Stereo D's Aaron Parry approaches conversion with such an approach, which has been met with some surprise by filmmakers: "'But aren't there rules? Aren't there things that I'm not supposed to do?' We said, it's our job to make it great." This perspective sometimes means the artists at Stereo D face shots that are difficult to convert to 3D, such as over-the-shoulder shots with an out-of-focus figure in the foreground. Still, Parry believes that working with directors to address such challenges represents a far better approach than telling a creative person, "'This is the box you must live in.' That's the worst possible scenario for someone creatively, to be worrying about the technical issues that they may be setting up when they're really just trying to get the

[113] Jared Sandrew, in interview by the author, May 16, 2019.

[114] Jared Sandrew, in interview by the author, May 16, 2019.

emotion or the intent of a scene across." In a sense, Parry's philosophy represents a balance of working closely with filmmakers, but also ensuring that collaborators "think of us as a part of the process that you don't have to worry about."[115]

Thus, as Parry's characterization of the creative process suggests, 3D conversion professionals not only carefully negotiate 2D and 3D aesthetics amongst themselves but also when discussing their creative choices with directors of the films being converted. In Chapter 2, I discussed Tony Scott's tendency throughout his career to use long or telephoto lenses, which effectively reduce perceived depth. This arguably conflicts with a 3D conversion company's creative directive to add depth. While discussing the conversion of contemporary movie projects, Jared Sandrew notes two possible options when dealing with footage shot using long lenses: "You have to make up the volume, or you have to have it play flat." The latter option can make sense if you see 3D depth as an element of film form that can be modulated according to the needs of a given moment, as you would focal length or the dynamics of a musical score. However, it might alternately seem a counterintuitive approach for 3D, particularly if a filmmaker or viewer is specifically investigating for three-dimensionality. If a decision to take a flatter approach stands out to the director, "you can't say, it's because you shot it with a long lens. I mean, you can, but it doesn't really fly," Sandrew says.[116] In essence, Sandrew must carefully approach both conversions and conversations in a manner that fully realizes the film's potential in 3D but that also respects a director or cinematographer's choice of lens during the filming process.

[115] Aaron Parry, in interview by the author, Burbank, California, June 10, 2019.

[116] Jared Sandrew, in interview by the author, May 16, 2019.

In addition to carefully negotiating the relationship between 2D and 3D aesthetics, 3D conversion professionals also regularly consider the implications of their films being set in a larger franchise or cinematic universe. In 2019 alone, 10 of the 15 live-action films released by the majors in 3D were preceded by films in the same diegetic world, with an additional three otherwise adapted from preexisting film properties. Hollywood's tendency to build shared (and multiplatform) worlds is perhaps best exemplified by the Marvel Cinematic Universe (MCU), a singular diegesis with a genesis that just barely predates the 3D conversion craze. As with other film series, one of the first entries of the Marvel series to be released after 2009 would be the first of several in 3D. The MCU's first three films, *Iron Man* (2008), *The Incredible Hulk* (2008), and *Iron Man 2* (2010) did not have 3D conversions upon initial release, but stereo companies converted *Thor* (Stereo D cr., 2011), *Captain America: The First Avenger* (Stereo D cr., 2011), and every single Cinematic Universe film thereafter, totaling 20 movies as of July 2, 2019. Not all film franchises have the same relationship with 3D.[117] But given the pervasiveness of 3D sequels, if 2D-to-3D conversion represents a careful balancing of disparate, sometimes conflicting creative directives, considerations for specific franchises and cinematic universes become additional factors to consider when approaching a project. Indeed, each film in a franchise might itself be seen as the negotiated creative product of the director's vision and the franchise's broader story arcs or ethos.

Caetlin Benson-Allott has explored the relationship between Hollywood franchises and 3D technology, specifically analyzing the complex role of spectatorial expectations when

[117] Some film series started after 3D's contemporary emergence around 2009, thus all of the released films have been available in stereo. For example, *Pacific Rim* (Stereo D cr., 2013) and *Pacific Rim: Uprising* (Prime Focus cr., 2018) hit theaters with 3D conversion options. The same goes for Legendary Pictures's monster franchise, including *Godzilla* (Gener8 and Stereo D cr., 2014), *Kong: Skull Island* (Prime Focus ver., 2017), and *Godzilla: King of the Monsters* (DNEG 3D cr., 2019). However, such fully 3D film series are quite rare, given Hollywood's penchant for reusing its brands year after year, sometimes decade after decade.

watching sequels in an ongoing series. Tellingly, she starts her essay by quoting director James Cameron's criticism of bad 3D sequels such as *Friday the 13th Part III* (1982): "When movies got to the bottom of the barrel of their creativity and the last grasp of their financial lifespan, they did a 3-D version to get the last few drops of blood out of the turnip."[118] Instead of taking such a dismissive perspective at face value, Benson-Allott alternately considers the complexity of a viewer's engagement with the added dimension of stereoscopy. In particularly, she focuses on the narrative conventions and "rules" of particular franchises, and ultimately, films such as the *Friday the 13th* sequel use their "self-reflexive set pieces and stereoscopic gestures" to "engage the spectator as a franchise connoisseur, an expert who observes and enjoys the movie's performance of its rules."[119] That is, she positions 3D as more than product differentiation or as gimmick, instead dealing with how precisely stereo affects the relationship between spectator and film series in specific instances.

Following Benson-Allott's attention to the specific spectatorial pleasures of different film series, I want to underline the importance of increasing narrative and stylistic continuity in blockbuster franchises. Benson-Allott refers to the pleasures of horror as located in the repetition and modulation of particular rules and conventions. Such a characterization does not apply as readily to contemporary blockbuster series, many of which rely on increasingly serialized narratives. While individual films in the series might rely on similar narrative constructions and thematic conceits, the building of a singular, cohesive diegesis serves to suggest a more "complex" take on the film series. In some ways, contemporary "Cinematic Universes" such as those for Marvel and DC offer a parallel to what television scholar Jason Mittell has referred to

[118] Caitlin Benson-Allott, "Old Tropes in New Dimensions: Stereoscopy and Franchise Spectatorship," *Film Criticism* 37, no. 3 and *Film Criticism* 38, no. 1 (2013): 12-29.

[119] Benson-Allott, "Old Tropes in New Dimensions," 13.

as contemporary TV's "narrative complexity." Mittell argues that Fox's 1990s series *The X-Files* "exemplifies what may be the hallmark of narrative complexity: an interplay between the demands of episodic and serial storytelling."[120] Some might scoff at a connection between the superhero world-building in Marvel's *The Avengers* and the aesthetic trend typified HBO's *The Sopranos*, many blockbuster film series and television programs have increasingly moved toward the serial story in a manner that arguably boasts their cultural capital. Thus, to consider the implications of Benson-Allott's work for contemporary action series, any account of 3D's impact on the relationship between spectator and franchise will have to consider the changes in how films within a franchise now build on top of each other.

More specifically to this project, I see Hollywood blockbusters' increasing shift to serial narratives as paralleling digital 3D's move from emergence to immersion. As noted in Chapter 1, Ariel Rogers characterizes contemporary 3D as "an opportunity for viewers to behold and enter new and exotic spaces," putting it more in line with the perceived immersive effect of 1950s widescreen, rather than the popular expectation for objects to emerge from the screen in 1950s 3D.[121] Further, I previously discussed how contemporary filmmakers such as ILM's John Knoll and James Cameron actively participate in this discursive maneuvering, publicly criticizing 3D projectiles as distasteful gimmicks. In a way, this reframing represents a reconciliation between stereoscopic 3D and the popular understanding of film as an immersive narrative medium. Similarly, Hollywood's push toward singular diegetic worlds with carefully coordinated continuity, as best exemplified by the Marvel Cinematic Universe, also strives for increased immersive realism, allowing the audience to enter the hermetic seal to an arguably greater extent.

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[120] Jason Mittell, "Narrative Complexity in Contemporary American Television," *The Velvet Light Trap* 58, no. 48 (Fall 2006): 29-40.

[121] Rogers, *Cinematic Appeals*, 199, 210.

At the levels of both narrative and visual form, 3D blockbusters invite the spectator to enter their story worlds (and the industry's synergistic ecosystem).

Even if the serialization of blockbusters represents a gesture toward narrative complexity in big-budget films, the director remains the auteur of the cinema, requiring filmmakers to position the work as, simultaneously, unique creative visions and pieces of something bigger. In response to Martin Scorsese's 2019 suggestion that Marvel films are impersonal and not cinema, director Joss Whedon used Twitter to counter Scorsese's characterization and praise a fellow Marvel director: "I first think of [James Gunn], how his heart & guts are packed into [*Guardians of the Galaxy* (Stereo D, Prime Focus cr., 2014)]." In a sense, because each blockbuster balances episodic and serial elements, filmmakers, critics and audiences often find themselves weighing the cultural pros and cons of a film's singularity versus a cinematic universe's singularity. Like the directors of franchise films, 3D conversion companies also consider both the specific needs of a particular movie and the overarching aesthetic of the series as a whole. Stereo D's Chief Creative Officer Aaron Parry has suggested that the stereo for Marvel films tends to be "focused on giving the characters as much breath and depth as possible," as the Marvel creatives "really want their characters to sing."[122] While acknowledging the overall brand or overall of the Marvel series, Stereo D also points to the creative visions of the directors for each respective film. *fx guide* emphasizes that although the Stereo D team working on *The Avengers* was "experienced in the creative desires of the Marvel studio," the company's pipeline "is still creatively re-built each film to allow for the directors expression of how they feel their film should look in stereo."[123] In a sense, by strategically positioning itself as suited to the needs of both Marvel and of a specific

[122] Seymour, "Art of Stereo Conversion: 2D to 3D – 2012."

[123] Seymour, "Art of Stereo Conversion: 2D to 3D – 2012."

director such as Joss Whedon, Stereo D can market itself as a perfect fit for the commercial and creative balancing act of franchise filmmaking.

Representatives of DNEG have also emphasized the importance of balancing a particular style for a film franchise, on one hand, and the perspective of a particular director, on the other. Gener8 and DNEG have converted six DC Universe films, from *Batman v Superman: Dawn of Justice* (2016) to *Shazam!* (2019), and stereo supervisor Ben Breckenridge has overseen five of these films. Breckenridge says that when he first meets the director for a particular DC project, he explains the overall aesthetic approach that DNEG has taken with the 3D for the comic book franchise (which I will describe shortly). Breckenridge then sees if the director wants to go beyond that style in any way, and he even tells the filmmakers that they can take a different direction with the 3D if they see fit. However, he recalls, "I haven't had any directors say, 'I don't like this. I want to do something completely different for my film.'"[124] To be sure, Breckenridge and Paul Becker describe particular instances where directors had input on specific details they wanted to approach differently, but in essence, DNEG establishes a house style for the 3D and then offers the filmmakers the freedom to work within that creative framework.[125]

As Breckenridge puts it, DNEG's style under his supervision strives for 3D that is as close to the physical reality as possible.[126] This is enabled in part by the 3D conversion process

[124] Ben Breckenridge, in phone interview by the author, May 21, 2019.

[125] In Celine Tricart's *3D Filmmaking*, Victoria Alonso, Producer and Executive Vice President of VFX and Post-Production at Marvel Studios, characterizes her comic-book studio's relationship with 3D conversion: "We usually ask the 2D-to-3D conversion company to come in and look at our movie early enough when we have a cut that we feel is going to hold. We know that our movie will change; all of our films do. We're always trying to find the best story. But, we try to give them as much as we have right away as we're finding the story and finding the right moments for our film." Tricart, *3D Filmmaking*, 83.

[126] Breckenridge never used the word "physical reality" during our conversations, but I use this language to evoke the theories of Siegfried Kracauer. Siegfried Kracauer, *Theory of Film: The Redemption of Physical Reality* (Princeton: Princeton University Press, 1997).

that the former Gener8 team brought to DNEG, a process they call modeling and projection.[127] Breckenridge says their technique allows for the 3D conversion to be "photographically accurate" and "natural-looking." In essence, their process takes the original 2D footage and uses camera-track software to virtually recreate the space as accurately as possible. DNEG can input information such as camera lens, whenever available, so the program's algorithm can more precisely calculate how far apart different figures and objects are from each other and from the camera.[128] Further, the company uses this camera track in conjunction with actual visual effects assets such as computer-generated characters and actor's digital doubles, further ensuring the technical accuracy of their geometry (fig. 16). Thus, at its core, DNEG's approach to 3D conversion aspires to mimic the reality of the space in front of the camera as accurately as possible. Later, I will discuss 3D conversion through displacement, the other predominant technique in the industry and one that has a different relationship to the photographic reality.

If DNEG's technology produces 3D that is as realistic as possible, Breckenridge has developed a personal aesthetic that similarly strives to recreate the spatial relationships of the figures and objects that were in front of the camera. As he puts it, "My initial approach is to make [the 3D version] look natural and the same way that your eyes would expect to see it in 2D, just that we add a third dimension." More specifically, he says that if the camera track determines the character was five feet from the camera, he theoretically places the character five feet behind the screen plane. In other words, "It just looks like basically you are standing where

[127] For a brief discussion of what might also be termed the "3D reconstruction and projection method," see Bernard Mendiburu, *3D Movie Making: Stereoscopic Digital Cinema from Script to Screen* (Amsterdam: Elsevier, 2009), 146.

[128] Breckenridge, in phone interview by the author, May 21, 2019.

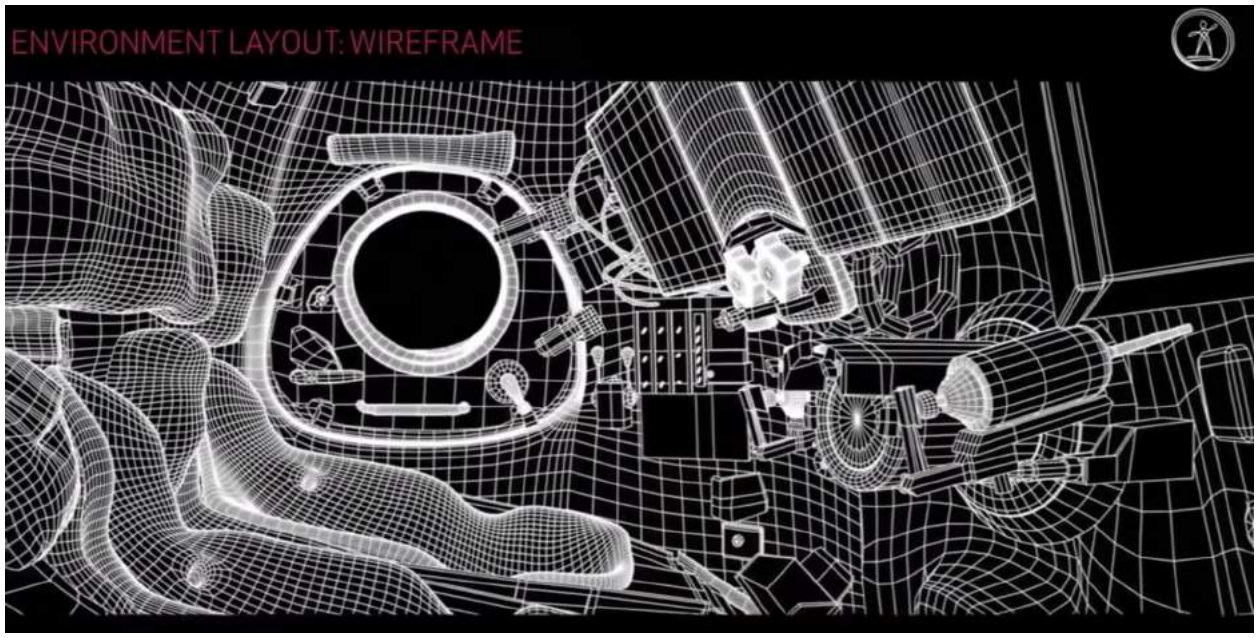

Figure 16: Although describing the Prime Focus process before the company's 2015 licensing agreement with Gener8 and the subsequent name change to DNEG, a video on *Gravity* describes the use of geometry and camera tracks for 3D conversion: "We take the geometry, apply the camera track to it, and from this, we can create the depth map." Source: kitfu choong, "Gravity Vfx Breakdown," YouTube video, 5:47, December 26, 2013, https://www.youtube.com/watch?v=cXGT4QOQn3U.

the camera was, looking at the scene that you are seeing in that shot."[129] It is important to emphasize here that the modeling and projection method does not necessitate placing the character behind the screen in such a way. This represents a specific creative approach that Breckenridge takes, emphasizing depth behind the screen rather than depth that extends beyond the screen into the space of the theater. For example, a supervisor with a different stereoscopic style could take the same character that was five feet away from the camera and actually move them into the theater space, "five feet" out into the theater. In other words, Breckenridge starts with the premise that the plane of the theater screen should be one and the same with the camera, and he then modulates accordingly depending on what he and the filmmakers wants to achieve for specific shots.

[129] Breckenridge, in phone interview by the author, May 21, 2019.

In essence, Breckenridge's conception of a realistic style features at least two components: faithfulness to the actual spatial relationships as they were presented on set and, relatedly, a viewing experience free from unnecessary distraction. Breckenridge argues that when 2D-to-3D conversion companies place characters outside of the screen plane, it creates the feeling that "the character is inside the camera." In his view, if a character was shot from the waist up a certain distance away from the camera, and the 3D depth cues place them in the theater space, "It kind of sends our brain for a loop and it takes us out of the moment. It's distracting you from the film."[130] That is, while the first component of Breckenridge's realistic style suggests a desire to realistically match the 3D space of the conversion to the actual space of the film set, the second component of his style aspires to match the stereoscopic viewing experience with everyday human perception.

DNEG's faithfulness to the actual distances between figures and objects as they were staged in front of the camera resonates with scholarly theoretical debates concerning realism and indexicality. Indeed, 3D conversion's reconstruction of spatial reality conflicts with André Bazin's writings on the cinema, which suggest that medium's power lies in its being "formed automatically, without the creative intervention of man."[131] That is, Bazin might have preferred native stereography, as its stereoscopic illusion depends on two side-by-side cameras, not the work of artists at 2D-to-3D conversion companies. Still, DNEG's use of camera tracks and geometry suggests a direct relationship between profilmic reality, 2D footage, and simulated 3D space. This approach to 3D conversion might then best be described as a form of algorithmically

[130] Breckenridge, in phone interview by the author, May 21, 2019.

[131] André Bazin, "The Ontology of the Photographic Image" in *What Is Cinema? Volume I*, trans. Hugh Gray (Berkeley: University of California Press, 1967), 13.

simulated realism, designed to recreate the depth cues of physical reality as accurately as possible.

Almost paradoxically, DNEG will even draw on the language of native 3D photography to characterize the strengths of its 3D conversion process. At the end of Chapter 1, I analyzed how 3D conversion professionals position their proprietary technologies as better than or theoretically no different from native 3D photography. This form of rationalization is especially evident in how Breckenridge frames DNEG's process of modeling and projection. Breckenridge and his colleagues coined the term "virtual native" to pitch then-Gener8's technology to the studios.[132] That is, because Gener8/DNEG digitally reconstructs the profilmic space and then "films" that space with two virtual cameras, they argue that they are simulating native 3D photography. Given how critics have pitted native 3D and converted 3D as unequal alternatives, Breckenridge's use of "virtual native" likely represents an inherent contradiction for many. While this explanation may seem like clever rhetorical spin to skeptics, it reveals how Breckenridge makes sense of his company's technology in a manner that flies in the face of popular understandings about 3D conversion. From DNEG's perspective, their algorithmically simulated realism is enabled by a form of virtual indexicality.

With regard to the second component of Breckenridge's realistic style, the emphasis on perceptual realism differs from scholarly and popular accounts that emphasize how stereoscopic 3D ruptures cinema's illusion. Indeed, Breckenridge's discussion of distracting from the story seems philosophically consistent with the critique that 3D emergence effects distract from Hollywood norms of invisible storytelling.[133] I previously addressed the negative parallax debate

[132] Breckenridge, in phone interview by the author, June 18, 2019.

[133] Bordwell, Staiger, and Thompson, *The Classical Hollywood Cinema*.

when discussing *Cinema Blend*'s "Before the Window" criterion, including William Paul's suggestion that 3D inherently deviated from classical style.[134] Thus, DNEG's overall approach to 3D conversion suggests how 3D in general can be applied in ways that are consistent with the predominant conception of Hollywood narration as invisible.

I use the term "perceptual realism" because I see resonances between how Breckenridge describes DNEG's style of 3D and how film scholar Stephen Prince discusses digital visual effects. Prince defines perceptual realism as "the replication via digital means of contextual cues designating a three-dimensional world."[135] He further explains that "the referential status of the representation is less important in this conception of realism."[136] That is, even if a computer-generated image might lack the indexicality that is central to a Bazinian notion of realism, visual effects artists still employ a variety of techniques to ensure that CGI still remains true to the physics of the world around us and the ways in which we process visual information to make sense of space. Similarly, though a 3D conversion might lack an obvious indexical relationship to the profilmic reality, DNEG's approach to 3D conversion relies on an understanding of image and space that produces something that is perceptually realistic. Their use of a camera track boosts the credibility of their stereoscopic illusion, and further, this specific technique challenges the binary of native 3D as real and converted 3D as fake.[137]

Although Breckenridge's style at DNEG emphasizes realism, because blockbusters such as the DC films are packed with fantastical elements, there is freedom to add depth for sights that

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[134] Paul, "The Aesthetics of Emergence."

[135] Prince, *Digital Visual Effects in Cinema*, 32.

[136] Prince, *Digital Visual Effects in Cinema*, 32.

[137] Yong Liu also makes connections between 3D and Stephen Prince's "perceptual realism." Yong Liu, *3D Cinematic Aesthetics and Storytelling* (Cham, Switzerland: Palgrave Macmillan, 2018), 30.

one would only encounter at the movies. Discussing *Batman v Superman*, Breckenridge comments how characters are "flying around, so it's stuff that you can just sort of have fun with because no one knows what it's supposed to look like."[138] Gener8, which is officially credited for the film, would animate the depth for shots of flying characters. In other words, the amount of stereo depth would not be fixed for a given shot. Some POV shots of Superman flying around would begin a bit shallower but then grow deeper in stereoscopic cues by the end of the shot. Breckenridge says this creates a subliminal "vertigo" effect, even if the audience might not notice exactly how the 3D contributes to this feeling.[139] In a sense, Breckenridge's approach to 3D echoes echoes how fantastical films themselves negotiate the real and the fantastic. The most recent DC movies in particular have been known for grounding themselves with dark, gritty aesthetics that connote a sense of emotional or psychological realism. As previously noted, Jared Sandrew discussed how, for *Man of Steel*, director Zack Snyder "really wanted to ground Clark in the real world."[140] Thus, as those at DNEG produce the parallel text that is their 2D-to-3D conversion, they have appropriately adopted a style that parallels the creative prerogatives of fantasy films built around human emotions and experiences.

This balance of everyday human drama and fantasy permeates *Godzilla: King of the Monsters* (2019), also converted by DNEG as overseen by Breckenridge. The vast majority of the film is not a battle of city-destroying monsters but a family drama, about the split between Mark (Kyle Chandler) and Dr. Emma Russell (Vera Farmiga) and how this division impacts their daughter Madison (Millie Bobby Brown). To be fair, most family separations are not entangled

[138] Breckenridge, in phone interview by the author, May 21, 2019.

[139] Breckenridge, in phone interview by the author, May 21, 2019.

[140] 3DCreativeSummit, "Jared Sandrew of Legend3D On Man of Steel @3DCS 2014," YouTube video, 27:58, March 31, 2014, https://www.youtube.com/watch?v=Ds0P0XrRnMs.

with ecoterrorists weaponizing large monsters, but much of the film unfolds in simple conversations presented in shot/reverse shot. As is consistent with Breckenridge's style, characters who are speaking in a given shot tend to be shown with positive parallax, behind the screen plane as if they are in front of the camera. (In over-the-shoulder shots, the shoulder might be further negative into the theater space, but the action largely leads our eyes to focus on the character who spatially feels "in front of" the camera.)[141]

This realism, of course, exists alongside the unique considerations of converting large monsters such as Godzilla and his adversaries Ghidorah and Rodan into 3D. One important challenge specific to 3D is a potential miniaturization effect. In real life, because the distance between our two eyes is only a matter of inches, we can only see binocular depth cues up to a certain number of feet away from us. After this distance, our eyes are not far apart enough to render separate views of the phenomena. Thus, technically speaking, we can only see humongous buildings and other entities as effectively flat. By artificially adding binocular depth cues to a large monster, 3D conversion companies run the risk of turning a multi-story monster into what the viewer perceives as a small model or toy, even if this might be something that only registers on a subconscious level. That is, our brain determines that if we can see these depth cues, the object must be, more or less, right before our eyes. Breckenridge refers to the perceived relative size of the monsters as the main creative consideration for a film like *Godzilla*: "Any scene or shot that contains one of the creatures, the main factor in that is preserving that scale and just making sure that they're perceived as massive in comparison to their environment."[142] In

[141] This mixing of human drama and fantasy is far from new, as clearly demonstrated with Ishiro Honda's original *Gojira* (1954). Ostensibly about the threat of a larger monster, the movie allegorizes post-war Japanese anxieties about nuclear annihilation and the ravages of war.

[142] Breckenridge, in phone interview by the author, June 18, 2019.

essence, fantastical elements such as Godzilla personify the complexity of perceptual realism. While the fact that Godzilla does not actually exist theoretically gives 3D conversion professionals more freedom to apply 3D, they will likely stay true to optical principles of perceptual realism to ensure the cinematic impact of the monstrous.[143]

Disney's Jared Sandrew approaches the 3D for his projects with an overall philosophy very similar to Breckenridge's. Sandrew says, "For the most part, I'm going for comfortable realism with moments of, wow, that is the most amazing thing I've seen in 3D."[144] One can see such exceptional "3D moments" in the Tim Burton-directed live-action reimagining of *Dumbo* (2019), when the titular flying elephant comes out of the screen through negative parallax. In Guy Ritchie's *Aladdin* (2019), the treasures that tempt Aladdin (Mena Massoud) and his monkey companion Abu in the Cave of Wonders come out into the theater space, accentuating the allure of these beauties that, if touched, will put the characters' lives at risk. In both of these instances, the fantastical once again becomes associated with 3D's emergence effect and a momentary but narratively motivated point of stereoscopic punctuation. Sandrew details his formula of comfortable realism by breaking down how, in his films, particular shot scales result in characters at different relative planes in 3D space. For example, for a close-up one shot, Sandrew would likely place the character such that their eyes are just in front of the screen plane. For a medium shot, the character would be 2 to 4 pixels positive, or behind the screen. For a wide shot, they would be 10 to 12 pixels behind the screen plane.[145] Further, Sandrew builds in more volume to the character's faces and bodies the closer they are to the screen, mimicking the nature

[143] For an examination of miniaturization in 3D cinema, and its possibilities, see Jones, *Spaces Mapped and Monstrous*, 193-220.

[144] Jared Sandrew, in interview by the author, May 16, 2019.

[145] Jared Sandrew, in interview by the author, May 16, 2019.

of binocular depth cues in everyday life. His description of his style both underlines the sort of perceptual realism that drives his logic but also indicates the film form analysis that is necessary for 2D-to-3D conversion work. Indeed, breaking down shots by scale and composition echoes the research of a text-centric film scholarship.

If Breckenridge and Sandrew often emphasize the role of realism in 3D conversion, others involved in stereoscopic filmmaking instead emphasize how 3D cinema actually *differs* from human binocular depth perception. Rob Hummel was CEO of post-production in North America at Prime Focus from 2009 to 2010 and president of Legend3D from 2010 to 2012. He criticizes how 3D poster boy James Cameron frequently links how we watch 3D movies and how we perceive the real world. For example, in a 2012 *VOA* interview, Cameron said, "Why is 3D better? Well, because we're not a race of Cyclopes. We have two eyes. We see the world in 3D. It's the way we perceive reality … It's an alignment, it's a calibration of our entertainment industry, to the way in which we actually sensorally perceive the world."[146] It is precisely this sort of comment with which Hummel would taket issue. Talking about Cameron's 3D philosophy, Hummel says, "He's wrong. That's not the way we see things."[147] He goes on to explain that in real life, our eyes are actually focusing and converging on objects, the two processes always coupled together. However, with 3D, when objects appear to emerge from the screen, the viewer is forced to do something they normally cannot do in real life: eyes converge in front of the theater screen while they are actually still focused on the screen.[148] Here, Hummel

[146] Stephanie Ho, "James Cameron Discusses 3D Movies, Sea Exploration at Beijing Film Festival," *VOA*, September 26, 2012, https://www.voanews.com/archive/james-cameron-discusses-3d-movies-sea-exploration-beijing-film-festival.

[147] Rob Hummel, in phone interview by the author, May 6, 2019.

[148] Hummel, in phone interview by the author, May 6, 2019.

uses his deep understanding of human perception and film technologies to demystify the notion that somehow 3D films mimic how we see the world in real life.

To support his notion of 3D's un-reality, Hummel references how stereoscopic filmmaking often uses an interocular difference far greater than that of human beings. By interocular distance, I am referring to the distance between our two eyes. As previously discussed in relation to *Godzilla*, because our eyes are only a limited distance apart, we have a limited field within which we can actually see using binocular depth cues. Hummel estimates that this field extends approximately 18 feet, after which our eyes are not far apart enough to gather differing visual information. As he explains, "Most of your world is 2D: when you're driving, when you're looking at landscapes."[149] Again, Hummel uses his intimate knowledge of perception and technology to make a sophisticated argument about how 3D cinema does not necessarily reflect how we see most of the real world. He specifically cites *Gravity* (Prime Focus ver., 2013) as a key example of an artificially large interocular distance, or stereo base. He notes that it is "funny" how the star fields have 3D depth cues: "Amazingly, when I go outside at night, we're seeing the same star field that Sandra Bullock would see."[150]

Further, although DNEG's Breckenridge prefers to use camera track software to calculate the spatial relationships between the figures in front of the camera as accurately as possible, the 2D filmmaker's stylistic choices may necessitate further human intervention in the 2D-to-3D conversion process. For example, if a scene is darkly lit or overexposed, DNEG's camera tracking software will have difficulty discerning high contrast points in the image to effectively follow the various objects in the scene using the automated algorithm. In these instances,

[149] Hummel, in phone interview by the author, May 6, 2019.

[150] Hummel, in phone interview by the author, May 6, 2019.

Breckenridge says an "artist has to go in and tell the software that this point is staying on this location throughout the duration of a shot."[151] Breckenridge's use of the word "artist" in referring to a 3D conversion professional is telling here. In essence, the camera tracking software essentially creates a baseline for the conversion process, but certain types of shots and images yield specific creative challenges that require the more subjective perspective of an artist to effectively discern the spatial relationships of the scene.

DNEG faces a similar challenge when elements in a shot are out of focus. As previously discussed, long lenses reduce the perceived depth in a shot, a potential issue for professionals tasked with adding depth. To an extent, this issue of long lenses is a problem of shallow depth of field. Thus, in a portrait shot of a character with an out-of-focus background, it is difficult for the camera tracking software and human viewers to discern exactly how far away the character is from their surroundings. Again, the 3D conversion artist must rely on their own creative instincts, and Breckenridge says they can "sort of arbitrarily place the background where it feels correct in stereo."[152] As demonstrated in this example, 3D conversion balances a faithfulness to actual spatial relationships on set with a consideration of what *feels* right to an artist and, potentially, a viewer. Sometimes, this means adding at least some additional depth cues to the background, even if in reality, we would not have binocular depth cues to differentiate separate planes: "If you can tell it's a blue and green background because there's a field and the sky, we may give a little bit of a gradient to the field and a little bit of depth to the sky, just so that there's some perception of depth back there. It doesn't just read like a flat card behind the character."[153]

[151] Breckenridge, in phone interview by the author, June 18, 2019.

[152] Breckenridge, in phone interview by the author, June 18, 2019.

[153] Breckenridge, in phone interview by the author, June 18, 2019.

Such subtle shading of defocused backgrounds that would, in reality, be beyond the capabilities of our binocular perception suggests that the perceptual realism of 3D conversion is tempered by a sense of what might be overtly counterintuitive in an artistic, stereoscopic rendering of a space.

Despite the flexibility of the company's style, DNEG's physical reality-based approach represents a sort of philosophical foil for displacement, the other primary approach to 3D conversion. As I explained in Chapter 1, the different 3D conversion companies make seemingly contradictory (albeit non-specific) claims about competitors adopting techniques that they pioneered. The proprietary nature of these companies' technologies only compounds this lack of clarity regarding the precise evolution of each company's particular approach. That said, DNEG's Paul Becker explains how his original company Gener8 uniquely employed modeling and projection, which differed from the industry norm of displacement.[154] Simply put, if modeling and projection relies on generating virtual stereoscopic cameras through camera tracks and geometry, displacement requires a more explicitly artist-driven approach in determining the relative spatial relationships for the figures on screen. For *Edge of Tomorrow* (ver., 2014), released before the 2015 deal initiating Gener8's absorption into DNEG, Prime Focus referred to their process as a "Hybrid Stereo Pipeline. As *Digital Media World* characterized it, "A stereo camera pair is generated from *hand-sculpted* [emphasis added] disparity maps to produce a virtual rig that will work in any CG or compositing environment, allowing the VFX vendor to render CG assets with exactly the right amount of depth for a given slice of the scene."[155] The use of "hand-sculpted" suggests the extent to which some approaches to 3D require an increased

[154] Becker, in phone interview by the author, March 1, 2019.

[155] Adriene Hurst, "Prime Focus Handles Stereo Conversion for Edge of Tomorrow," *Digital Media World*, accessed January 26, 2020, https://www.digitalmediaworld.tv/in-depth/389-prime-focus-handles-stereo-conversion-for-edge-of-tomorrow.

role for conversion company artists in determining the spatial relationships among figures in z-space.

In essence, displacement requires 3D conversion professionals to isolate the various objects in a given shot and assign each of them a relative depth value. Some stereographers articulate this using a number of pixels representing how much each element will appear to be in front of or behind the theatrical screen.[156] Some practitioners discuss the artists' subjective sense of 3D space as one of 3D conversion's advantages. As Stereo D's Aaron Parry suggests, "Sometimes, in native stereo cinematography, geometry is geometry, but sometimes it doesn't look right. There's sort of this inherent, what's right isn't necessarily mathematically accurate. That's probably what we enjoy, is shaping that space just a little bit more in conversion."[157] DNEG's Breckenridge uses different language to characterize the intervention of artists: "When you do it with displacement, you're just giving that 2D plate to an artist, and they are cutting it into layers and then arbitrarily sculpting the image and placing the layers in the image where they think they should go … By using geometry for vehicles and characters, we get correct proportions, so there's no guesswork."[158] These quotes suggest how different perspectives on 3D conversion techniques echo debates of formalism versus realism, with the freedom of animation techniques and the precision of camera tracks offered as differing approaches. In reality, these views are not mutually exclusive, as most companies employ an aesthetic or process that might

[156] For a discussion of the related "depth map" technique used by Robert Neuman for the 3D conversion of *The Lion King*, see Tricart, *3D Filmmaking*, 82.

[157] I want to note that Stereo D does not strictly use artist sculpting. They use scans of actors and other CG assets, albeit sometimes for reference. I reference this quote largely because it speaks to possible creative benefits of a more artist-driven approach. Parry, in interview by the author, June 10, 2019.

[158] Breckenridge, in phone interview by the author, May 21, 2019.

lean in one direction but that ultimately incorporates both extremes.[159] Thus, professionals' tendencies to discuss their technologies in terms that resonate with an essence of artistry or stereoscopic cinema further underline the value of practitioner explanations as not just insights into production processes but as cultural expressions in their own right.[160]

In this section, I do not intend to appraise one method of 3D conversion over another. (If at times I appear to be privileging a discussion of DNEG's approach, this has more to do with their representatives being the most open and transparent about the specifics of their processes.) Further, the companies' approaches are tremendously fluid, consistently being adapted to meet the unique challenges presented by specific projects. Thus, I explore practitioners' theories and parallel scholarly theories, in part, to challenge the perception of 3D conversion as a monolithic entity. I began Chapter 1 of this dissertation by examining the history of cultural debates over 3D, which often played out in terms contrasting the supposed fourth wall-shattering spectacle of stereoscopic cinema and the invisibility of classical Hollywood storytelling. In some ways, professionals' varying approaches within the 3D conversion community exemplify a similar tension, as they seek to build on or modify how we understand the cinema as alternately fantastical and realistic. By highlighting the contradictions of 3D conversion and its theorizations, I move past popular tendencies to dismiss conversion as an opportunistic technical gimmick or, at best, begrudgingly accept the process as an industrial reality with niche appeal. Alternately, I propose 3D conversion as a site of epistemological contestation, one that forces us

[159] In a sense, the tensions between realistic and formalist conceptions of 3D cinema lie at the heart of Nick Jones's book, as suggested by its title: *Spaces Mapped and Monstrous*. That is, Jones highlights the coexistence of "the data-rich, *mapped* optics of computer vision [emphasis added]" and the *monstrous* or "distorting, peculiar visuality of stereoscopic media." While Jones expands on these different visual modes in ways that move beyond and complicate classical notions of realism and formalism, the core arguments concerning 3D cinema's paradoxical precision and manipulation still resonate with these long-standing scholarly debates about the essence of (planar) cinema. Jones, *Spaces Mapped and Monstrous*, 5.

[160] Caldwell, *Production Culture*.

to reckon with the existential messiness of parallel texts and, more significantly, the constructed nature of how we understand and value cinema and its practitioners.

Conclusion

Histories and Futures of Digital 3D Cinema

From July 15, 2018, to April 1, 2019, the Los Angeles County Museum of Art (LACMA) hosted an exhibit entitled "3D: Double Vision." The presentation explored binocular imagery in many forms, still and moving, animated and photographic, extending from the 1838 stereoscope to contemporary applications in art and digital cinema. Unsurprisingly, the text accompanying the displays addressed the complexities of 3D's cultural status as bad object. Near the exhibit's start, text read: "Audience response to 3D has always toggled between celebration and denigration; critics have found it easy to dismiss as superficial, a misapplication of advanced technology to cheap thrills." However, repeatedly, the exhibit implicitly countered such potential criticisms by opting for bold statements concerning the aesthetic and utopian possibilities of 3D. Under the heading "Seeing Machines," text proclaimed that 3D "offers metaphors for understanding ourselves and our history. Duality is built into 3D; the eyes receive two images and the mind perceives a singular world. Likewise we have the capacity to synthesize multiple points of view and appreciate the existence of difference in unity." The very placement of 3D in such a respected arbiter of artistic and cultural history already works toward the legitimization of 3D imagery, and the commentary on the exhibition walls go to great lengths to position stereoscopic imagery as a means to existential and social introspection.[1]

[1] Peter Decherney and Haidee Wasson have researched the history of cinema's relationship to art institutions such as the Museum of Modern Art (MoMA) in New York. Referring to the museum's Film Library, Wasson suggests how MoMA "laid an enduring foundation and helped to create a common sense about cinema: film is an art with a history that matters to a public aware of its place in a differentiated field of cultural practice." Peter Decherney, *Hollywood and the Culture Elite: How the Movies Became American* (New York: Columbia University Press, 2005); Haidee Wasson, *Museum Movies: The Museum of Modern Art and the Birth of Art Cinema* (Berkeley: University of California Press, 2005), 5.

Even more specific to this dissertation, the exhibit featured actual work by 2D-to-3D conversion companies. A theater seating up to 30 people played a series of clips from both classical and digital 3D films. Many of the featured films represented the familiar canon of natively shot stereoscopic films: Alfred Hitchcock's *Dial M for Murder* (1954), James Cameron's *Avatar* (2009), Werner Herzog's *Cave of Forgotten Dreams* (2010), Henry Selick's stop-motion animated feature *Coraline* (2009), Jean-Luc Godard's *Goodbye to Language* (2014), Martin Scorsese's *Hugo* (2011), and Wim Wender's *Pina* (2011). However, the exhibit also featured 3D conversions including Prime Focus's *Gravity* (ver., 2013), Legend3D's *The Walk* (ver., 2015), and Stereo D's *Titanic* (with Venture 3D ver., 2012) and *Star Wars: The Last Jedi* (cr., 2017). On one hand, such inclusions might seem surprising given the widespread critical denigration of 2D-to-3D conversion dating back to 2010. On the other hand, these presentations make sense given 3D companies' participation in LACMA's exhibit. According to a post on Deluxe, Stereo D's parent company, their 3D subsidiary consulted on "on stereo presentation technology and imagery," and a team of Stereo D employees worked on the on "the digital image restoration of the archival still photography, film and video footage, and artworks."[2] Further, the theater projecting the 3D movie sizzle reel used RealD technology, a system found in many multiplexes. More generally, Hollywood's role in the 3D exhibit is indicative of LACMA's increasing ties to the Hollywood community, most clearly demonstrated by the Academy of Motion Picture Arts and Sciences leasing the museum's property for its own movie museum.[3]

[2] "Deluxe's Stereo D Helps Power LACMA's Upcoming '3D: DOUBLE VISION' Exhibition," *Deluxe*, July 12, 2018, https://www.bydeluxe.com/en/get-to-know-us/news/deluxes-stereo-d-helps-power-lacmas-upcoming-3d-double-vision-ex/.

[3] Relatedly, costume designer and UCLA Professor Deborah Nadoolman Landis curated a 2013-2013 exhibit on the history of costume design for LACMA. Rebecca Keegan, "The costumes are the stars of film academy exhibit," *Los Angeles Times*, September 26, 2014, https://www.latimes.com/entertainment/movies/la-et-mn-hollywood-costume-academy-museum-exhibit-20140928-story.html.

Notably, the language about 3D cinema in the LACMA exhibit often reflected the discourses that recur when 2D-to-3D conversion companies characterize the creativity and legitimacy of their work. After a brief mention of digital advancements in native stereoscopic photography, the text by the Hollywood Cinema theater entrance read: "Experts in visual effects and animation became conversion artists, honing their tools and skills to transform 2D into 3D." The use of words such as "experts," "artists," and "skills," as well as the mention of more readily understood crafts such as visual effects and animation, emphasizes the aesthetic value of 3D conversion alongside native stereography. The LACMA exhibit's text continues on to specifically address the aesthetic politics of 3D: "The excessive negative parallax, or pop-out effects, from the 1950s did not entirely disappear from the 3D cinematic vocabulary, but generally, stereographers now take a more naturalistic, optically coherent approach, providing audiences with an immersive experience." This sentence taps into the long-standing debates sketched throughout this dissertation concerning which uses of 3D are most legitimate. Specifically, the museum exhibit distances contemporary 3D from the cheap carnivalesque thrills of 1950s schlock and instead embraces a "naturalistic" approach more akin to good taste and Hollywood classicism. As I have shown throughout this study, employees of 2D-to-3D conversion companies often use precisely this sort of language to position their work as artistically valid and palatable to 3D skeptics.

In a sense, the LACMA exhibit offered one possible history of 3D and its cultural legacy. Looking ahead, how are different stakeholders imagining the future of 3D? According to individuals I interviewed for this project, there are glimmers of hope. Firstly, international markets such as China still turn out in large numbers for 3D Hollywood films, almost all of which are now converted. The Chinese market continues to grow and is projected to represent

the world's largest moviegoing audience in 2020.[4] Further, the Chinese market actually *requires* the import of a specific number of 3D and IMAX films. The Chinese government allows only 34 international films each year to participate in profit-sharing agreements, and the rules stipulate that at least 14 of these must be in 3D and/or IMAX.[5] Legend3D founder Barry Sandrew suggests that many young Chinese audiences do not simply prefer premium experiences such as 3D but expect them: "Most of the new generation, that's all they know. They know 3D movies. That's all they've seen for the most part, and that's what they expect. Not only that, when you give them glasses to wear, they see the glasses as a sign or an indication of a premium experience. They identify it with a premium experience."[6] All of these factors considered together, 3D cinema and, by extension, 3D conversion would appear to have a stable future ahead.

At the same time, developments such as the disappearance of 3D televisions and Blu-rays from the North American market do not bode well for 3D's future. In Chapter 1, I discussed popular discourses proclaiming the death(s) of 3D, particularly in relation to box office and other premium formats such as IMAX. However, some might point to the failure of 3D TV as perhaps the best example of stereoscopic media's limited commercial potential. Filmmakers such as James Cameron saw 3D television as crucial to widespread acceptance of stereo images. Chuck Tryon details how Cameron tried to use his cultural cache as the director of *Avatar* and a

[4] Paul Bond, "China Film Market to Eclipse U.S. Next Year: Study," *The Hollywood Reporter*, June 5, 2019, https://www.hollywoodreporter.com/news/china-film-market-eclipse-us-next-year-study-1215348.

[5] Jonathan Papish, "Foreign Films in China: How Does It Work?," *China Film Insider*, March 2, 2017, http://chinafilminsider.com/foreign-films-in-china-how-does-it-work/.

[6] Jason McDowall, "Barry Sandrew (Legend3D Founder / Magnify World) on the Controversy of Colorizing the Classics from the Golden Age of Hollywood (Part 1)," *The AR Show*, April 26, 2018, https://www.thearshow.com/podcast/012a-barry-sandrew-part1.

"technological auteur" to promote 3D television.[7] Cameron positioned 3D film and 3D television as deeply intertwined: Home video releases of films such as *Avatar* could boost 3D TV sales, and the widespread adoption of 3D TV would create further incentives for studios and exhibitors to continue investing in 3D. As Cameron put it in a 2012 interview, "We can't make movies in 3D fast enough to justify the wide adoption of 3D TVs so in my enlightened self-interest as a film-maker I want to see the broadcaster market expand rapidly so everyone is watching in 3D."[8] Simply put, everyone had to do their part for the 3D revolution to really come together.

However, as it turned out, the 3D revolution would not be televised. Disney became the first major studio to stop regularly releasing its 3D features on 3D Blu-ray for the North American market. Instead, starting around 2013's *Frozen*, Disney only released 3D versions for many of its films in international markets, albeit in region free formats that permitted the niche collectors in the U.S. to still access these stereoscopic films. Despite Disney's shift in strategy, the other major studios continued to release the vast majority of its films on 3D Blu-ray in North America. Of the major studios' 31 3D films in 2016, only 6 did not receive such releases.[9] For the 27 3D films in 2017, the number not released on Blu-ray 3D jumped to 12, representing approximately 44% of the titles. And finally, for the 27 3D films in 2018, the major studios for the first time did not release 3D Blu-rays in North America for the majority of their stereoscopic releases: 17, approximately a 63% share.

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[7] Chuck Tryon, *On-Demand Culture: Digital Delivery and the Future of Movies* (New Brunswick: Rutgers University Press, 2013), 84-85.

[8] Kate Bulkley, "James Cameron and the pursuit of 3D," *The Guardian*, September 19, 2012, https://www.theguardian.com/media-network/media-network-blog/2012/sep/19/james-cameron-3d-tv-film.

[9] With "3D films in 2016," I am identifying films by their theatrical release date, not their home video release date. The 6 titles included Disney's *The Finest Hours*, *Alice Through the Looking Glass*, *The BFG*, and *Pete's Dragon*, as well as Fox/DreamWorks's *Trolls* and *Paramount*'s *Ben-Hur* remake.

Predictably, 3D television's decline spawned its fair share of articles proclaiming that the medium had passed on. In January 2017, *Business Insider*'s Kif Leswing said 3D TV was "officially dead," as "there are no more major TV-makers that make 3D TVs anymore."[10] Leswing himself was referencing a CNET article with a remarkably animated headline: "Shambling corpse of 3D TV finally falls down dead."[11] CNET's news hook for that article was the revelation that LG and Sony, the two companies that were then still manufacturing 3D-capable televisions, would finally halt production in 2017. CNET's David Katzmaier cites specific numbers to underline the downward trends preceding these decisions: "According to data from the NPD Group, 3D TV represents just 8 percent of total TV sales dollars for the full year of 2016, down from 16 percent in 2015 and 23 percent in 2012. Native 3D-capable Blu-ray players fell to just 11 percent of the market in 2016, compared to 25 percent in 2015 and 40 percent in 2012."[12] To be fair, pronouncements of 3D TV's death had much more teeth than those generally proclaiming 3D cinema's demise. While the articles I discussed in my first chapter tended to extrapolate from depressed box office figures, 3D-TV-is-dead articles could actually point to the material end of manufacturing and sale.

The fate of 3D television affects not only consumers but also the companies converting films into 3D. Barry Sandrew said that "everybody involved in the industry" uses LG monitors to review content. But, of course, no electronic device works forever, and the 3D conversion companies will need either new monitors or a new strategy. Sandrew told me how he asked his friends at LG, "'Where is the inventory? I could sell a thousand of them at three times what you

[10] Kif Leswing, "3D TV is dead," *Business Insider*, January 24, 2017, https://www.businessinsider.com/3d-tv-is-dead-2017-1.

[11] David Katzmaier, "Shambling corpse of 3D TV finally falls down dead," *CNET*, January 17, 2017, https://www.cnet.com/news/shambling-corpse-of-3d-tv-finally-falls-down-dead/.

[12] Katzmaier, "Shambling corpse of 3D TV finally falls down dead."

were charging before right now.' They're not available."[13] Disney stereoscopic supervisor Jared Sandrew has similar concerns about when his team's monitors eventually die out. He says those working in the industry have been using refurbished televisions since 2016. Although Jared has his own theater for reviews, he still uses monitors for his quality control process "because I can get the brightness that I need and I can zoom in and do all of the stuff that I want to do."[14] When his current monitors die out, he figures he will need to use a "consumer-grade stereo projector" instead.[15] 3D cinema is not dead, but the death of 3D TV presents infrastructural challenges to the work of making 3D movies.

But even if 3D televisions might be dead, technological deaths are often followed by rebirths. Some in 3D conversion see ancillary potential in the properties they have already converted. Barry Sandrew believes that companies such as Disney understand, "Even if it's not going to make a lot of money today, it will make money. If you have two eyes, there's a lot you can do with it later on. You do this at a high-enough resolution, it's going to help."[16] The reference to high-resolution versions emphasizes the importance of "future proofing" library titles for further advances in distribution formats.[17] In essence, Sandrew argues that, even if Blu-ray 3D technology is essentially nonexistent in markets such as North America today, the 3D versions of Hollywood blockbusters may present monetization opportunities for the studios in the future.

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[13] Barry Sandrew, in interview by the author, Los Angeles, California, March 18, 2019.

[14] Jared Sandrew, in interview by the author, Burbank, California, May 16, 2019.

[15] Jared Sandrew, in interview by the author, May 16, 2019.

[16] Barry Sandrew, in interview by the author, March 18, 2019.

[17] The move from live video to 35mm masters in early television proved essential to the syndication opportunities so central to profits for producers. Circa 2000, shows such as *The Wire* originally aired in the traditional 4:3 aspect ratio but also considered widescreen framing in lieu of the shift to HD televisions already underway.

Any conversation about the future of 3D almost inevitably evolves into a discussion of other emerging media technologies, including Alternate Reality (AR) and Virtual Reality (VR).[18] TechDay, a series of startup events held in London, Los Angeles, and New York, has proclaimed, "Virtual Reality is Succeeding Where 3D TV Failed." The online post says, "We thought 3D was the next big step in consumer tech and it completely failed. In 2015, virtual reality occupies that same hyped-up space in tech, but it's going to succeed."[19] They say this is because there is already more content for VR compared than for 3D, and VR is "relatively affordable as long as you already have either a smartphone or computer."[20] In 2016, a *Newsweek* article entitled "Is Virtual Reality the Future of Film?" discussed how IMAX planned to offer VR experiences by Hollywood directors in multiplexes. The article begins with a teleological refrain: "First came sound, then color, then 3D—now virtual reality (VR) is lining itself up to be the next major innovation in filmmaking."[21] Articles such as these support a narrative that VR will do what 3D could not do, or that VR would be the next logical step to build on what 3D accomplished. In other words, VR will "win," or be the next step in the evolutionary chain.

With all this talk of virtual reality as the future, it is little surprise that 3D conversion companies themselves dipped their toes into the VR waters. In February 2015, Legend3D

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[18] Ariel Rogers explores the relationship between virtual reality and cinema, with references to stereoscopic 3D and particular attention to questions of immersion. Alternately, James Fleury considers VR in the context of contemporary media convergence. Ariel Rogers, "'Taking the Plunge': The New Immersive Screens," in *Screen Genealogies: From Optical Device to Environmental Medium*, ed. Craig Buckley, Rüdiger Campe, and Francesco Casetti (Amsterdam: Amsterdam University Press, 2019), 135-158; James Fleury, "Hollywood's VR Vision: New Frontier or Virtually the Same Thing?," in *The Franchise Era: Managing Media in the Digital Economy*, ed. James Fleury, Bryan Hikari Hartzheim, and Stephen Mamber (Edinburgh: Edinburgh University Press, 2018), 277-299.

[19] "Virtual Reality is Succeeding Where 3D TV Failed," *TechDay*, accessed September 12, 2019, https://techdayhq.com/community/articles/virtual-reality-is-succeeding-where-3d-tv-failed.

[20] "Virtual Reality is Succeeding Where 3D TV Failed."

[21] Anthony Cuthbertson, "Is Virtual Reality the Future of Film?," *Newsweek*, May 24, 2016, https://www.newsweek.com/virtual-reality-future-film-461829.

announced a VR division.[22] In 2016, Prime Focus announced a VR-focused joint venture with visual effects house Digital Domain.[23] Indeed, the industry's broadened technological focus was perhaps best exemplified by the domain name change for the leading 3D society's website. In 2016, the Advanced Imaging Society still hosted its site at international3dsociety.com.[24] By the end of 2017, however, the organization had moved its site to a more inclusive URL: theadvancedimagingsociety.com.[25] 3D was no longer the focus but was instead but one component of a larger community related to emerging technologies.

Despite this apparent seismic shift in what industry insiders consider the "future," some 3D conversion veterans remain deeply pessimistic about the possibilities of virtual reality as more than niche entertainment. When I asked him about his overall takeaways looking back on his career in 3D conversion, Barry Sandrew immediately discussed the complex relationship between consumers and technology, and how the limited success of 3D television spelled trouble for VR. Sandrew describes his perception of Hollywood in the last few years as an "echo chamber of creative people and technical people who said [VR] was going to be the next big thing. 'Forget about everything you knew about moviemaking. It's going to be VR. In fact, you can get rid of every one of your screens. Every screen you have is going to go away.'"[26] The way

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[22] Kevin Noonan, "Legend3D Launches Virtual Reality Division," *Variety*, February 10, 2015, https://variety.com/2015/artisans/news/legend3d-launches-virtual-reality-division-1201430399/.

[23] Adrian Pennington, "Prime Focus and Digital Domain Launch VR Venture," *The Broadcast Bridge*, May 16, 2016, https://www.thebroadcastbridge.com/content/entry/5827/prime-focus-and-digital-domain-launch-vr-venture.

[24] Wayback Machine, October 29, 2016, accessed September 24, 2019, https://web.archive.org/web/20161029044828/http://www.international3dsociety.com/.

[25] Wayback Machine, November 12, 2017, accessed September 24, 2019, https://web.archive.org/web/20171112205146/https://theadvancedimagingsociety.com/.

[26] Barry Sandrew, in interview by the author, March 18, 2019.

Sandrew characterizes the more recent conversations about VR echoes the early hyperbolic proclamations of 3D's future, that all films would eventually be in 3D.

Sandrew points to specific tensions at conferences and industry gatherings that illustrate this distance between the VR evangelists and himself. Sandrew specifically discussed how he once sat on the board of governors for an unnamed "organization" but ultimately left. Specifically, he was reacting to the predictions of a fellow member at a conference: "He got up and started talking how entertainment is going to be all VR. Movie theaters are going to go away. I rolled my eyes and I quit. Because everyone who was in the room, who were significant, intelligent technical and creative people, were getting in lockstep."[27] Although Sandrew did not name the organization when speaking with me, he was named to the International 3D & Advanced Imaging Society board of governors in 2014 but no longer appears on the organization's list of governors online.[28] At another industry event, Sandrew specifically challenged fellow panelists to name any VR titles that had seen a return on investment. When his colleagues pushed back, commenting that VR was still in its early days, Sandrew responded, "'Since the '70s we've been making these incremental steps and we're still not there. It seems like virtual reality has been 10 years in the making for the past 30 years.' Obviously, my panel didn't appreciate me, but that's a fact."[29]

I address Sandrew's skepticism concerning virtual reality not to take a position either for or against VR but rather to illustrate how "new" technologies repeatedly become the subject of

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[27] Barry Sandrew, in interview by the author, March 18, 2019.

[28] "Barry Sandrew Of Legend3D Named To International 3D & Advanced Imaging Society Board Of Governors," press release, March 11, 2014, https://www.prnewswire.com/news-releases/barry-sandrew-of-legend3d-named-to-international-3d--advanced-imaging-society-board-of-governors-249439311.html; "AIS 2019 Board of Governors," accessed September 24, 2019, https://theadvancedimagingsociety.com/board-of-governors/. Stereo D's Aaron Parry, also interviewed for this project, is still on the board of governors.

[29] Barry Sandrew, in interview by the author, March 18, 2019.

complex debates about consumers, art, entertainment, business, and the future. 2D-to-3D conversion and 3D cinema more generally are far from the only processes to be alternately praised as the Second Coming, rejected as overrated or overhyped, and everything in between. My research considers 3D conversion's successes and failures not as exceptional ruptures but rather as contingent points in a continual process of negotiation and contestation. By the time you are reading this, 3D and VR alike might again be perceived as resuscitated, even more dead, or still on their steady paths of growth toward the next big thing. The fact that these debates about cinematic mediums will continue in some shape or form highlights how individuals make sense of their relationship to film in ways directly or indirectly influenced by deeply held cultural and aesthetic beliefs.

After reflecting on the possible histories and futures of 2D-to-3D conversion, I find it important to emphasize the current state of the industry, one characterized by R&D and active creative problem solving. Jared Sandrew reflected on the topic of a conversation he had recently had with a colleague at projection company RealD: "The average person that doesn't like 3D hasn't seen a movie in 3D in three years. The work that we've done and that the vendors have done and that the studios have done has just gotten so much better. If you do the work to find the right theater, it's a really great experience."[30] My study sheds light on the intellectual and creative labor of 2D-to-3D conversion professionals in the years since *Clash of the Titans* (Prime Focus cr., 2010). The reputation of such early conversions might persist in the memories of conversion skeptics, but 3D conversion is not a static process. It is a dynamic industry of constant aesthetic negotiation and self-theorizing, as well as competing philosophies for how to conceptualize 2D films as parallel 3D texts.

[30] Jared Sandrew, in interview by the author, May 16, 2019.

Filmography

Ordered by North American release date, this list includes all live-action 2D-to-3D conversions released by the six major studios—Disney, Fox, Paramount, Sony/Columbia, Universal, Warner Bros.—from March 5, 2010 to 2019 (exceptions noted).[1] In this filmography and throughout this dissertation, I use "cr.," standing for "credits," to indicate that the preceding company or companies received credit at the end of the film. When multiple companies precede "cr.," they appear here in their order of appearance in the credits. By contrast, "uncr." follows the name of companies that worked on films but did not receive credit. These were instead verified through independent sources such as the companies' sites or my personal interviews. Further, I use "ver.," standing for "verified" to indicate films listed on conversion company filmographies but not yet independently checked through the ending credits.

Alice in Wonderland (Sony Pictures Imageworks Inc. and Legend3D cr.; March 5, 2010)

Clash of the Titans (Prime Focus cr.; April 2, 2010)

The Last Airbender (Stereo D cr.; July 1, 2010)

The Chronicles of Narnia: The Voyage of the Dawn Treader (Prime Focus cr., Gener8 uncr.; December 10, 2010)

Gulliver's Travels (Stereo D cr.; December 25, 2010)

The Green Hornet (Stereo D, Legend3D, Venture 3D, Sassoon Film Design, Sony Pictures Imageworks Inc. cr.; January 14, 2011)

Thor (Stereo D cr.; May 6, 2011)

[1] None of the six conglomerates' special divisions released live-action 2D-to-3D conversions during this period.

Priest (Venture 3D, Gener8, Legend3D, Trixter, Lucent Pictures Entertainment, C.O; May 13, 2011)

Pirates of the Caribbean: On Stranger Tides (native 3D + Legend3D cr.; May 20, 2011)

Green Lantern (Prime Focus and Legend3D cr.; June 17, 2011)

Transformers: Dark of the Moon (native 3D + Legend3D and Prime Focus cr.; June 29, 2011)

Harry Potter and the Deathly Hallows: Part 2 (Prime Focus; Pixel Magic; Sassoon Film Design; Animal Logic; ICO VFX, LLC; Gener8; I.E. Effects cr.; July 15, 2011)

Captain America: The First Avenger (Stereo D cr.; July 22, 2011)

Hugo (native 3D + Legend3D ver.; November 23, 2011)

Star Wars: Episode I – The Phantom Menace (Prime Focus ver.; February 10, 2012)

Ghost Rider: Spirit of Vengeance (Gener8 and Legend3D cr.; February 17, 2012)

John Carter (Cinesite and Stereo D cr.; March 9, 2012)

Wrath of the Titans (Prime Focus cr., Gener8 uncr.; March 30, 2012)

Titanic (Stereo D and Venture 3D ver.; April 4, 2012)

The Avengers (Stereo D cr.; May 4, 2012)

Men in Black 3 (Prime Focus cr.; May 25, 2012)

Prometheus (native 3D + Gener8 cr.; June 8, 2012)

Abraham Lincoln: Vampire Hunter (Stereo D cr.; June 22, 2012)

The Amazing Spider-Man (native 3D + Gener8, Legend3D, and Reliance Media Works cr.; July 3, 2012)

Frankenweenie (Prime Focus ver.; October 5, 2012)[2]

Life of Pi (native 3D + Legend3D cr.; November 21, 2012)

[2] *Frankenweenie* is animated, not live-action.

Hansel & Gretel: Witch Hunters (native 3D + Stereo D cr.; January 25, 2013)

Top Gun (Legend3D ver.; February 8, 2013)

Jack the Giant Slayer (native 3D + Gener8 cr.; March 1, 2013)

Oz the Great and Powerful (native 3D + Legend3D ver.; March 8, 2013)

G.I. Joe: Retaliation (Stereo D cr.; March 28, 2013)

Jurassic Park (Stereo D ver.; April 5, 2013)

Iron Man 3 (Stereo D cr., Gener8 uncr.; May 3, 2013)

The Great Gatsby (native 3D + Prime Focus ver.; May 10, 2013)

Star Trek Into Darkness (Stereo D cr.; May 16, 2013)

Man of Steel (Legend3D cr.; June 14, 2013)

World War Z (Prime Focus ver.; June 21, 2013)

Pacific Rim (Stereo D cr.; July 12, 2013)

R.I.P.D. (Stereo D ver.; July 19, 2013)

The Wolverine (Stereo D cr.; July 26, 2013)

Percy Jackson: Sea of Monsters (Stereo D ver.; August 7, 2013)

The Last Emperor (Prime Focus ver., September 10, 2013)[3]

The Wizard of Oz (Prime Focus ver.; September 20, 2013)

Gravity (Prime Focus ver.; October 4, 2013)

Thor: The Dark World (Stereo D cr.; November 8, 2013)

The Legend of Hercules (native 3D + Prime Focus ver.; January 10, 2014)[4]

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[3] Columbia Pictures originally released *The Last Emperor* in 1987, but it appears that the 3D conversion did not received a limited or wide release in the United States. The 3D version, however, did screen at the 2013 AFI Fest, as well as the 2013 Cannes Film Festival in France.

[4] *The Legend of Hercules* was released by Summit Entertainment, not one of the six major studios.

300: Rise of an Empire (Gener8 cr.; March 7, 2014)

Need for Speed (Stereo D ver.; March 14, 2014)[5]

Captain America: The Winter Soldier (Stereo D cr., Gener8 uncr.; April 4, 2014)

The Amazing Spider-Man 2 (Legend3D cr., Prime Focus uncr.; May 2, 2014)

Godzilla (Gener8 and Stereo D cr.;[6] May 16, 2014)

X-Men: Days of Future Past (native 3D + Stereo D cr.; May 23, 2014)

Maleficent (Gener8, Prime Focus, and Legend3D cr.; May 30, 2014)

Edge of Tomorrow (Prime Focus ver.; June 6, 2014)

Transformers: Age of Extinction (native 3D + Legend3D and Prime Focus cr.; June 27, 2014)

Hercules (Stereo D ver.; July 25, 2014)

Guardians of the Galaxy (Stereo D and Prime Focus cr.; August 1, 2014)

Teenage Mutant Ninja Turtles (Stereo D and Prime Focus cr.; August 8, 2014)

Sin City: A Dame to Kill For (native 3D + Prime Focus ver.; August 22, 2014)[7]

Exodus: Gods and Kings (native 3D + Stereo D cr.; December 12, 2014)

Jupiter Ascending (Gener8 and Legend3D cr.; February 6, 2015)

Seventh Son (Prime Focus cr.; February 6, 2015)

Avengers: Age of Ultron (Stereo D and Prime Focus cr.; May 1, 2015)

Mad Max: Fury Road (Stereo D ver.; May 15, 2015)

Poltergeist (Legend3D ver.,; May 22, 2015)

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[5] Stereo D's work on *Need for* Speed appears to be uncredited. I did not see the film during its theatrical run, and this title was not released on Blu-ray 3D in the United States. The 2D version I screened did not include conversion credits. 2D-to-3D conversion companies tend be credited at the end of both 2D and 3D versions of a movie, even when the stereo version only plays outside of the United States. For example, Legend3D and Gener8 received credit at the end of *The Hunger Games: Mockingjay – Part 2*, which only played flat domestically.

[6] Credits read "3D Digital Services by Gener8" and "3D Conversion by Stereo D."

[7] *Sin City: A Dame to Kill for* was released by the Weinstein Company, not one of the six major studios.

San Andreas (Stereo D ver.; May 29, 2015)

Jurassic World (Stereo D ver.; June 12, 2015)

Terminator Genisys (Stereo D and Prime Focus cr.; July 1, 2015)

Ant-Man (Stereo D and Prime Focus cr.; Legend3D uncr.; July 17, 2015)

Pixels (Prime Focus and Gener8 cr.; July 24, 2015)

Everest (Stereo D ver.; September 18, 2015)

The Walk (Legend3D ver.; September 30, 2015)

The Martian (native 3D + Prime Focus and Stereo D cr.; October 2, 2015)

Pan (Gener8 cr., Prime Focus uncr.; October 9, 2015)

Goosebumps (Legend3D ver., October 16, 2015)

Paranormal Activity: The Ghost Dimension (Prime Focus ver.; October 23, 2015)

In the Heart of the Sea (Prime Focus ver.; December 11, 2015)

Star Wars: The Force Awakens (Stereo D ver.; December 18, 2015)

Point Break (Stereo D cr.; December 25, 2015)

The Finest Hours (Legend3D cr.; January 29, 2016)

Batman v Superman: Dawn of Justice (Gener8 cr.; March 25, 2016)

Captain America: Civil War (Stereo D and Prime Focus cr.; May 6, 2016)

Alice Through the Looking Glass (Legend3D, Gener8, and Prime Focus cr.; May 27, 2016)

X-Men: Apocalypse (Stereo D, Legend3D, and Prime Focus cr.; May 27, 2016)

Teenage Mutant Ninja Turtles: Out of the Shadows (Prime Focus ver.; June 3, 2016)

Warcraft (Prime Focus ver.; June 10, 2016)

Independence Day: Resurgence (Stereo D and Legend3D cr., June 24, 2016)

The BFG (Stereo D cr.; July 1, 2016)

The Legend of Tarzan (Prime Focus ver.; July 1, 2016)

Ghostbusters (Legend3D and Gener8 cr.; July 15, 2016)

Star Trek Beyond (Stereo D cr.; July 22, 2016)

Suicide Squad (Gener8 cr.; August 5, 2016)

Pete's Dragon (Legend3D ver.; August 12, 2016)

Ben-Hur (Legend3D ver.; August 19, 2016)

Miss Peregrine's Home for Peculiar Children (Stereo D cr.; September 30, 2016)

Doctor Strange (Stereo D and Legend3D cr.; November 4, 2016)

Fantastic Beasts and Where to Find Them (Prime Focus, Stereo D, and Legend3D cr.; November 18, 2016)

Rogue One: A Star Wars Story (Stereo D cr.; December 16, 2016)

Assassin's Creed (Stereo D cr.; December 21, 2016)

Passengers (Legend3D ver.; December 21, 2016)

Underworld: Blood Wars (Legend3D ver.; January 6, 2017)

Monster Trucks (Prime Focus ver.; January 13, 2017)

xXx: Return of Xander Cage (Stereo D cr., January 20, 2017)

Resident Evil: The Final Chapter (Legend3D ver., January 27, 2017)

The Great Wall (Prime Focus ver.; February 17, 2017)

Kong: Skull Island (Prime Focus ver.; March 10, 2017)

Beauty and the Beast (Prime Focus cr.; March 17, 2017)

Ghost in the Shell (Prime Focus cr.; March 31, 2017)

Guardians of the Galaxy Vol. 2 (Stereo D and Southbay cr.; May 5, 2017)

King Arthur: Legend of the Sword (Prime Focus, Stereo D, and Legend3D cr.; May 12, 2017)

Pirates of the Caribbean: Dead Men Tell No Tales (Legend3D and Prime Focus cr.; May 26, 2017)

Wonder Woman (Gener8 cr.; June 2, 2017)

The Mummy (Stereo D ver.; June 9, 2017)

Transformers: The Last Knight (native 3D + Prime Focus cr.; June 21, 2017)

Spider-Man: Homecoming (Stereo D, Legend3D, and Southbay cr.; July 7, 2017)

War for the Planet of the Apes (Stereo D and Prime Focus cr.; July 14, 2017)

Geostorm (Stereo D cr.; October 20, 2017)

Thor: Ragnarok (Stereo D and Legend3D cr.; November 3, 2017)

Justice League (Gener8 cr.; November 17, 2017)

Star Wars: The Last Jedi (Stereo D cr.; December 15, 2017)

Jumanji: Welcome to the Jungle (Gener8 Canada and Gener8 India cr.; December 20, 2017)

Black Panther (Stereo D and Legend3D cr.; February 16, 2018)

A Wrinkle in Time (Legend3D and Gener8 cr.; March 9, 2018)

Tomb Raider (Southbay cr.; March 16, 2018)

Pacific Rim: Uprising (Prime Focus cr.; March 23, 2018)

Ready Player One (Stereo D cr.; March 29, 2018)

Rampage (Stereo D cr.; April 13, 2018)

Avengers: Infinity War (Stereo D and DNEG Stereo cr.; April 27, 2018)

Solo: A Star Wars Story (Stereo D cr.; May 25, 2018)

Jurassic World: Fallen Kingdom (Stereo D cr.; June 28, 2018)

Ant-Man and the Wasp (Stereo D, DNEG Stereo, and Legend3D cr.; July 6, 2018)

Skyscraper (Stereo D cr.; July 13, 2018)

Mission: Impossible - Fallout (Prime Focus cr.; July 27, 2018)

The Meg (Legend3D cr.; August 10, 2018)

Alpha (Legend3D cr.; August 17, 2018)

Venom (DNEG Stereo cr.; October 5, 2018)

The Nutcracker and the Four Realms (DNEG cr.; November 2, 2018)

Fantastic Beasts: The Crimes of Grindelwald (Gener8 and Stereo D cr.; November 16, 2018)

Mortal Engines (Stereo D cr.; December 14, 2018)

Aquaman (Gener8 cr.; December 21, 2018)

Bumblebee (Stereo D cr.; December 21, 2018)

Alita: Battle Angel (native 3D + Stereo D cr.; February 21, 2019)

Captain Marvel (Stereo D and Legend3D cr.; March 8, 2019)

Dumbo (DNEG cr.; March 29, 2019)

Shazam! (DNEG cr.; April 5, 2019)

Avengers: Endgame (Stereo D, DNEG Stereo, and Legend3D cr.; April 26, 2019)

Pokemon: Detective Pikachu (Legend3D cr.; May 10, 2019)

Aladdin (DNEG cr.; May 24, 2019)

Godzilla: King of the Monsters (DNEG 3D cr.; May 31, 2019)

Dark Phoenix (Stereo D cr.; June 7, 2019)

Men in Black: International (DNEG cr.; June 14, 2019)

Spider-Man: Far from Home (Stereo D and Legend3D cr.; July 2, 2019)

The Addams Family (DNEG cr.; October 11, 2019)[8]

[8] *The Addams Family* was not released by one of the major studios. Rather, it was distributed by United Artists Releasing, a joint venture between Metro-Goldwyn-Mayer and Annapurna Pictures. However, I mention it as a significant oddity, an animated film with credits indicating "3D Conversion by DNEG." While a 3D animated film such as Warner Bros.'s *The Lego Movie* (2014) also credits Legend3D, that earlier film features sequences of live-

Maleficent: Mistress of Evil (DNEG cr.; October 18, 2019)

Jumanji: The Next Level (DNEG cr.; December 13, 2019)

action footage. Further, anti-conversion watchdogs such as realorfake3d.com have historically considered computer-animated features as "Real" alongside native 3D photography. This is because two stereoscopic cameras can be rendered "natively" inside the virtual computer-animated diegesis.

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