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**The “Positive Parallax”: Narrative, Spectacle and the “Aesthetics of  
Recession” in Digital 3D Cinema**

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## **Abstract**

Against the backdrop of stereoscopic cinema's current revival and its integration of digital technologies, this PhD project will argue that contemporary 3D films have become more sophisticated in their use of stereoscopic effects for narrative purposes. Hence, I argue that conventional associations of 3D with spectacle rather than narrative are not adequate in considering digital 3D as a storytelling tool – rather than supplanting narrative, 3D can be used to enhance and deepen it. I analyse the narrative tropes and techniques explored by contemporary 3D filmmakers, arguing that the dominant paradigm governing these tropes and techniques emphasises the virtual space *behind* the screen (the positive parallax), rather than in front of it (the negative parallax), as was the case in earlier “waves” of 3D cinema. I refer to this newly dominant paradigm as “the Aesthetics of Recession”. Integrated with digital technologies such as CGI and digital compositing, this approach fosters a more measured deployment of spatial effects than the “protrusion effect” evident during previous 3D booms.

Although a few contemporary films, whether schlock films or popular blockbusters, still exploit such “protrusion effects,” in most cases they are used much more sparingly in order to give audiences the sense of a complete experiential world existing within the film – a world in which narratives can flourish. Using this measured approach, contemporary digital 3D cinema works to establish a sense of the “hyperreal” that is grounded in human perceptual capabilities associated with our binocular vision. This kind of “reality effect” is ideal for the kinds of immersive stories that Hollywood favours. On this basis, 3D filmmakers set up different types of spatiotemporal relations that contribute to narrative. These include: the creation of differential “timespaces”, in which narrative actions unfold; the staging of dramatic encounters in “expanded” space; the spatial layering/juxtaposition of characters’ psychological perspectives; and the juxtaposition of flatness and depth according to the dramatic/ontological qualities of characters and spaces. Closely aligned with the Aesthetics of Recession, all these new narrative techniques illustrate the storytelling possibilities embedded in digital 3D cinema’s engagement with space and volume.

*For my father*

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## **Introduction: Stereoscopic Narrative, Spectacle, and 3D Ontology**

3D cinema invariably invokes questions of distinction: beyond the obvious dimensional effect, what are the differences between 2D and 3D cinema? For technology writer Clyde deSouza, 3D acts “as a whole new ‘medium’ of storytelling and is to be explored and exploited as such for creating a new genre of movie and storytelling that has not been possible before” (qtd in Zettl 158). If deSouza’s claim is correct, what is the “new genre” and “new storytelling” provided exclusively by 3D cinema? What are the qualities of this new mode of storytelling that “has not been possible before”? Or, from a more concrete perspective, what can 3D technology, in its new digitised incarnation, contribute to visual storytelling beyond visual trickery or spectacle that is also genuinely different from 2D cinematic narratives?

Against the backdrop of stereoscopic 3D cinema’s resurgence and its integration with digital technologies, I will attempt to answer these questions by arguing that contemporary digital 3D cinema has advanced as a storytelling medium in using stereoscopic effects for sophisticated narrative purposes. Hence, conventional associations of 3D with spectacle rather than narrative are not adequate in considering digital 3D as a storytelling medium – rather than supplanting narrative, 3D can be used to enhance and deepen it. Indeed, 3D can provide a level of experiential immersion that contributes to, rather than impedes, the modes of narrative immersion that Hollywood favours. Drawing on a range of contemporary examples, most of which are Hollywood productions, I will demonstrate how filmmakers have explored stereoscopy’s narrative potential. In doing so, I will argue that recent 3D films tend to display a formal paradigm that I call “the Aesthetics of Recession”.

The Aesthetics of Recession, marked by their departure from the “protrusion effect” that has sometimes taken prominence during previous 3D booms, are crucial to the development of new narrative techniques: they allow for a more measured and nuanced deployment of spatial effects, producing dynamic and immersive “spaces” in which narrative tropes and techniques can be deployed. Under the Aesthetics of Recession, emphasis is on the positive parallax (the space *behind* the screen) rather than the negative parallax (the space in front of it). This marks a difference between contemporary 3D and its antecedents, which often placed greater emphasis on the negative parallax. I argue that it is this key strategic shift – under the new paradigm of

the Aesthetics of Recession – that unleashes 3D’s narrative potential, because the positive parallax space provides a much more stable foundation for filmmakers to orchestrate narrative encounters and effects. This foundation, however, is very different from the flat plane of 2D cinema. We can understand this difference as fundamental and even ontological: 3D’s visual field is best represented as an “oval sphere” with imbalanced spatial duality, a model that is fundamentally different from 2D imagery’s “flat canvas”. The screen (as the zero parallax) in 3D cinema resembles a window inserted between the positive volume (positive parallax space) and the negative volume (negative parallax space), both of which are transparent and extend in opposite directions. The inserted window not only demarcates the oval-shaped entity but also provides a nexus for the two spatial volumes; moreover, it does not equally divide the dual volumes in this oval sphere, but rather grants infinite depth to the positive volume behind the window while retaining limited swell for the negative volume in front of the window.

Despite the contemporary emphasis on the positive parallax, negative parallax effects have not been abandoned. Rather, they are used sparingly and incorporated into the new strategy, in order to enhance narrative and immerse the audience in the illusory cinematic world of the diegesis. This more controlled approach helps contemporary digital 3D cinema establish a sense of “hyperrealism” that is grounded in human perceptual capabilities associated with our eyes’ binocular vision. Stereoscopy’s “reality effect” is ideal for the kinds of immersive stories that Hollywood favours. Indeed, the films I will discuss here are primarily Hollywood films: they represent some of the most successful and dominant productions in the current 3D era and are exemplary of recent trends in digital 3D cinema. On the basis of stereoscopic hyper-realistic effects, 3D filmmakers have explored different types of spatiotemporal relations that contribute to stereoscopic narrative, which I will discuss in the following chapters. In particular, my elaboration will concentrate on how the different types of constructed stereoscopic “timespaces” provide environments for dramatic change and actions; how the staging depth of the 3D field screen engenders dramatic encounters between characters; how the volumetric space can be used to multiply characters’ psychological perspectives and to identify them with, or distinguish them from, spectatorial perspectives; and how the symbiotic coexistence of flatness and depth in stereoscopy can be used to frame the dramatic and ontological

qualities of characters and spaces. All these new narrative techniques, I argue, can be linked to the Aesthetics of Recession: all of the films I discuss here make sparing use of the negative parallax, while drawing action and attention into the deep space of the positive parallax.

The investigation of digital 3D cinema's narrative effectiveness is, therefore, the main contribution of this PhD project to stereoscopic media studies, in which commentators tend either to deny or downplay 3D's narrative potential (Paul, "The Aesthetic of Emergence" 321-55; Belton, "Digital 3D Cinema" 187-95; Sandifer, "Out of the Screen" 62-78). Of course, not all discussions of 3D are primarily concerned with narrative *per se*. In her book *3D Cinema: Optical Illusions and Tactile Experiences*, Miriam Ross puts aside such debates and focuses her discussion on 3D's unique visual mode and artistic forms. One must also note that considerations of narrative in 3D overlap with other concerns, including spatiotemporal relations, concepts of realism, and the framing of spectatorship. Writing in 1980, Michael Kerbel commented that "images in depth raise questions about realism vs. expressionism, mise en scene vs. montage, and the audience's relationship to the screen – in short about the very nature of the film medium" ("3-D or Not"). All these questions "about the very nature of the film medium" are either directly or indirectly related to narrative issues: for example, both "realism vs. expressionism" and "mise en scene vs. montage" have very clear narrative resonances, while "the audience's relationship to the screen" can be seen as tightly entwined with the reception of narrative. Therefore, narrative issues are closely tied to "the very nature" of the cinematic medium: all of cinema's narrative tropes and techniques are derived from and determined by its fundamental material and formal properties, or, to put it another way, its ontology.

To return to Kerbel's above point, then, what is exactly "the very nature" of the stereoscopic film medium? What is the ontological and phenomenological difference between stereoscopic 3D and flat 2D? Furthermore, what is "the very nature" of *digital* stereoscopic cinema? Has its ontological nature changed from its predecessor – filmic stereoscopy? After answering this series of questions in Chapter 2, I will go on to excavate how the "very nature" of digital 3D cinema engenders unique narrative capabilities. These capabilities have arguably been overlooked

during previous 3D booms, in which the greater emphasis has been on powerful spectacle – a quality which has long been recognised as 3D’s advantage. Within this framework, I will examine how contemporary 3D filmmakers harness 3D spectacle and incorporate it to leverage narrative values.

I argue that it is the transformative strategy of the “Aesthetics of Recession” that eventually makes the two elements – spectacle and narrative – work together for storytelling within the stereoscopic context. In 2D cinema, the two elements have been accompanying and competing with each other for over a hundred years. As Geoff King notes, “[e]lements of spectacle and narrative co-exist across the history of Hollywood cinema, in varying combinations” (184). For King, “narrative” is defined in two senses: The first “refers to ‘plot’ or ‘story’: the on-going events of a film, both as depicted on screen and as the viewer is invited to recreate them. The second refers to thematic structures such as the patterns of oppositions, negotiations and in some cases imaginary reconciliations that can be found in – or read into – Hollywood narrative structures” (183). In this thesis, I will mainly adopt King’s definition as the basis for my discussion of narrative within the 3D context.

As King’s account suggests, the relationship between narrative and spectacle is variable. King goes on to argue: “Narrative structures remain important...in terms of both story/plot and thematic issues, often working in combination with the delivery of spectacle” (184). Since its very early days, Hollywood has adopted such tactics, combining narrative and spectacle to attract and satisfy audiences. But the formulation of the combinations between narrative and spectacle, as King suggests, “needs to be examined, in all its specificity, without the exercise of sweeping and over-stated generalizations” (184). Although 3D cinema only has about sixty years of history in terms of commercial theatrical distribution, it crosses three periods of Hollywood: the “classical” Hollywood, in which a cohesive set of narrative principles became established (1930s-50s), the “New Hollywood”, split between the emergence of alternative narrative forms on the one hand and the rise of spectacle cinema on the other (late 1960s to early 1980s), and contemporary Hollywood, with its integration of digital technologies and aesthetics (since the 1990s). The combinations of narrative and spectacle in 3D films are especially “varying”, not only because the technological involvement of 3D weighs on it, but also because 3D’s periodical integration of or

competition with other cinematic technologies such as widescreen, Cinerama, digitisation and High Frame Rate complicates the situation.

For example, 3D's first commercial boom in the early 1950s followed Hollywood's "golden age" (1930s-40s), but also coincided with both television's breakthrough challenge and competition from inside the movie industry from other innovations such as the Cinerama and Cinemascope formats (Kerbel, "3-D or Not"). To maintain its big screen spectacular advantage, 3D films made during this initial boom intentionally accentuated its long hyped visual feature – the "protrusion effect" along the Z-axis. Many "Dimensional Effects" (a term commonly used by Hollywood 3D filmmakers in the early 1950s for "protrusion effect" shots) that showcase the visual gimmick of objects jutting out towards the viewer's eyes were already scripted before filming. Ray Zone describes how the director of *House of Wax* (1953) filmed "dimensional effects" that had been incorporated in the screenplay; descriptions of these effects were presented in capital letters for emphasis (*3-D Revolution* 32-4). However, not all films of the era were so dependent on such effects: Zone lauds Curtis Bernhardt's *Miss Sadie Thompson* (1953) for its use of "defining space behind the foreground" and "shooting in depth" so as to avoid "protrusion effects" (57).

However, in the phase of novelty showcasing, spectacle and narrative were imbalanced, in the sense that some filmmakers favoured exploiting 3D to highlight the former while weakening the latter. This is borne out by the fact that most critical emphasis of the 1950s 3D films was on their "aberrational status," in particular via their emphasis on the "protrusion effect" (Paul). The choice of content was shaped by 3D – as Paul puts it: "If things are going to pop out of the screen, what should they be?" According to Paul, *Bwana Devil* (1952) was promoted as a "two-pronged attraction: TERROR and SEX". The tag-line from the ad promised "A LION in your lap! A LOVER in your arms!" (328). Alfred Hitchcock, however, intentionally did the opposite in *Dial M for Murder* (1954), using 3D to emphasise storytelling and explore spatial relationships between characters. Another exception was the 3D musical *Kiss Me Kate* (George Sidney, 1953). Arguing that "stereography presents to the storyteller an expanded narrative palette with subtler and more seductive tools to invoke belief" (41), Ray Zone singles out *Kiss Me Kate* as one of "the most seamless applications of stereo space to narrative, movement, color, and sound" (41). Therefore, from the very

beginning of 3D cinema's commercial breakthrough, the combinations of spectacle and narrative were "varying", although many of these early 3D films prioritised spectacle, relying on 3D's visual novelty.

During 3D's booms in the 1970s and early 1980s, paralleling the New Hollywood movement (in particular the rise of large-budget "spectacle cinema"), spectacle remained the dominant motivation for 3D. However, 3D's narrative aspects were expanded somewhat as filmmakers applied the technology to a wider range of genres including martial arts and soft-core porn films. Kerbel claims that "[t]he Seventies [3D] films are extremely stylized" ("3-D or Not"). This favouring of spectacle over narrative carried over into the early stage of the most recent 3D boom, which began around the mid 2000s, resulting in a number of cheesy horror and adventure movies such as *Night of the Living Dead* (2006), *Journey to the Center of the Earth* (2008) and *Piranha 3D* (2010). At the same time, 3D animation began to thrive (the crossover made easier by the fact that animation was already dominated by digital production processes). *Avatar*'s global box-office sweep and the 3D animation film *Coraline*'s influential success in 2009 have turned the tide of 3D cinema substantially towards more balanced combinations of narrative and spectacle. During this period, a greater emphasis on narrative has accompanied the rise of the Aesthetics of Recession.

Of course, the current preponderance of 3D is not simply the result of a change in the aesthetic climate. The growth of 3D cinema has been fostered by integration with digital technologies, making its production process more fluid and allowing for the seamless amalgamation of computer generated images. In addition, the worldwide adoption of digital projectors has helped digital 3D reach much wider global audiences. More importantly for this study, the flexibility of digital tools and processes has arguably fostered more experimentation and innovation on the part of filmmakers, encouraging the exploration of 3D's narrative potential alongside its capacity for display and spectacle. Therefore, it will be necessary for me to provide a historical overview of 3D's technical issues and aesthetic development, in order to set up the framework for my main discussion of contemporary 3D cinematic narratives.

In Chapter 1, "From 'Dimensional Effects' to Digital 3D Cinema", by combing through the short history of theatrically-released stereoscopic cinema, I

illustrate the aesthetic transformations that have shaped 3D from the previous booms to its current digital incarnation. Here, I will focus on the relationship between spectacle and narrative. I will also consider the concept of “realism” and discuss its complex connotations within different historical contexts and their impact on the relationship of spectacle and narrative. Based on such discussion, I develop a description of digital 3D cinema’s unique regime of “stereoscopic hyperrealism”, considering stereoscopy alongside digital technologies and processes such as CGI. This overview will set up a historical and aesthetic framework for my subsequent discussion of contemporary 3D cinematic narratives.

In the second chapter, “From ‘Redemption of Physical Reality’ to ‘Recreation of Perceptual (Hyper)reality’”, I undertake a comparative analysis of the distinctions between 2D and 3D cinema based on a correlation between production mode and perceptual physiologies. Moreover, with reference to Siegfried Kracauer’s classic remark that “the nature of film is the redemption of physical reality” (*Nature of Film*), I argue for 3D’s enhanced ability to (re)construct and recreate a “hyper-reality”, based on 3D’s (actual or virtual) two-camera mechanism and its integration with digital technologies. Furthermore, based on the above argument, I show how 3D’s hyper-reality leads to distinctive aesthetic approaches, comparing contemporary examples of 2D and 3D cinema. This chapter thus considers the question of “the very nature” of stereoscopic cinema, from which narrative tropes and techniques are derived. It therefore provides the ontological basis for my subsequent discussion of such tropes and techniques, from the spatiotemporal articulation of 3D “timespaces” to the layering of narrational perspectives.

In the third chapter, “Stereoscopic Timespaces”, I develop a more specific discussion about the combination of spectacle and narrative in 3D films based on Aylish Wood’s notion of “timespaces” – distinctive spatiotemporal configurations that result from the splicing of original footage and digital effects in contemporary cinema – as well as her consideration of the multiple connotations of “spectacle” (“Timespaces in Spectacular Cinema” 370-386; *Digital Encounters* 45, 55). Geoff King uses the term “spectacle” “primarily to refer to sequences that employ a heightened degree of spectacle or spectacular action: the ‘big’ chase sequence, the ‘big’ explosion or the ‘big’ outburst of special effects, for example” (184). I

incorporate his usage and Wood's articulation of it into my address of "spectacle", which I trace all the way back to Tom Gunning's concept of "the Cinema of Attractions" (63-70). Considering 3D timespaces as vehicles both for spectacle and for narrative action, this chapter provides a "springboard" for the discussion of narrative tropes and techniques in the following chapters.

In Chapter 4, "Volumetric Dramaturgy: Staging Drama in Depth", I focus my analysis on 3D's capacity for enabling and enhancing dramatic staging. Contemporary filmmakers have consciously taken the advantage of 3D cinema's spatial depth to maximise dramatic intensity and emphasise narrative relations and confrontations. Based on David Bordwell's theoretical analysis of the narrational principle in classical Hollywood cinema ("Classical Hollywood Cinema" 17-34), and Edward Branigan's cognitive narrative theory (*Narrative Comprehension and Film*), I argue that 3D's contributions to both dramatic staging and narrational techniques are primarily rooted in the positive parallax space while complemented by limited use of the negative parallax effect, thus exemplifying the current predominance of the "Aesthetics of Recession".

In the fifth chapter, "Within and Without: Trans-Subjective Narrative Perspective in Digital 3D Cinema", I combine the cognitive film theory represented by Edward Branigan (*Point of View*) and David Bordwell (*Narrative in the Fiction Film*) with the phenomenological theory represented by Vivian Sobchack (*The Address of the Eye*). Considering the connections between cinematic perspectives *within* the film and the viewer's perspective *on* the film, I argue that 3D produces both a multiplication and fusing of narrative perspectives. The ambiguous figure of the "invisible observer" is central to this investigation. Distributing narrative planes and perspectives along the Z-axis, 3D cinema brings into question the customary relationships among spectatorial, narrational and character perspectives. Moreover, 3D films reflect directly upon these altered subjective relations by producing a *trans-subjective* narrative perspective, in which the tendency for overlapping and alternating character and spectatorial perspectives foregrounds the intrasubjective and intersubjective foundations of 3D cinematic viewing.

Chapter 6, "Between Depth and Flatness: Shaping Stereoscopic Ontology", in contrast to the consistent focus on stereoscopic depth throughout the previous

chapters, returns to the question of flatness. Here, I focus on deliberate deployments of flatness *within* the context of 3D imagery. I argue that such deployments of flatness are primarily determined by narrative aims: they allow for the delineation and definition of characters, spaces and dramatic moments. Incorporating Lev Manovich's concept of "Ontological Montage" ("Compositing: Film Image Streams" 70), I categorise the application of flatness in 3D cinema into four modes: *remediation*, *juxtaposition*, *morph*, and *synthesis*. Each of these modes serves different narrative ends, working in different ways to complement or contrast with stereoscopic depth. Ultimately, I argue that the alternation or layering of flatness and depth enhances narrative by highlighting the dramatic and ontological qualities of characters and spaces.

In summary, this PhD project attempts to answer the series of questions posted in the very beginning of this introduction, by arguing that contemporary digital 3D cinema has become more sophisticated in using stereoscopic effects for narrative purposes. Building on a historical, technical and aesthetic overview of 3D cinema in the previous and current booms, and an ontological comparison between 2D and 3D imagery, I provide a detailed discussion of contemporary 3D cinema's distinctive narrative tropes and techniques, arguing that its narrative effectiveness is tightly entwined with the new artistic paradigm of the Aesthetics of Recession.

## Chapter 1: From “Dimensional Effects”<sup>1</sup> to Digital 3D Cinema

...the very nature of an art form is as “significant” as a plotline or its formal treatment.

And if the distinctive characteristics of a given art form fail to embody some of these deep-seated urges—that species of art is doomed to extinction.

Only those species survive, whose constitution and attributes resonate with these deeply rooted, intrinsic, organic tendencies and needs of the spectator and artist alike. (Sergei Eisenstein, “On Stereocinema [1947]” 21)

In this chapter, I will first outline the short history of stereoscopic 3D cinema (with a primary focus on Hollywood) from its first commercial theatrical release in the early 1950s all the way up to digital 3D’s current resurgence. This history will be informed by technological concerns, since 3D cinema’s ups and downs over the last six decades have been closely tied to advances in stereoscopic technologies, whether competing or integrating with other technologies. The lens of technological progress and its influence on 3D cinema’s periodic volatility allows us to understand why 3D had a very short-lived, initial boom in the early 1950s, followed by a more diffuse second wave during the 1970s, and another intense but brief one in the early 1980s. Despite the fact that 3D technologies developed noticeably between each of these “booms”, in each case their success was limited by the failure to integrate them with other emergent cinematic technologies. By contrast, 3D cinema’s current resurgence has maintained its momentum over the past ten years by integrating with digital technologies, so that 3D screening has become entrenched in cinemas worldwide, alongside the conventional 2D format.

Beyond rehearsing the history of 3D cinema, this chapter will also provide a review of scholarly work in this area, including historical, theoretical and critical works, and will crystallise a number of key issues, concepts and debates underpinning the development of my main argument, in particular regarding questions of narrative and spatiality. This chapter will also explore a handful of key 3D-related developments that are of relevance to the project as a whole, but which do not belong

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<sup>1</sup> “Dimensional Effects” was the term commonly used by Hollywood 3D filmmakers for filming “protrusion effect” shots during the first 3D boom in the early 1950s.

within any of the following chapters. These include stereoscopic sound, 2D to 3D conversion, and High Frame Rate (HFR) video capture.

### **The History of 3D Cinema**

On December 25<sup>th</sup>, 1952, the first commercially released 3D feature movie, *Bwana Devil* (Arch Oboler) had its first public screening. As a surprising box office success, it sparked the first boom of 3D filmmaking in the US. The following two years saw the release of 46 3D features, including Columbia Pictures' *Man in the Dark* (Lew Landers, 1953) and *Gun Fury* (Raoul Walsh, 1953), and Warner Bros.' *House of Wax* (Andre de Toth, 1953) and *Dial M for Murder* (Alfred Hitchcock, 1954). As William Paul sums up, "of the 46 3-D films made, 16 were Westerns, 9 suspense, 5 horror and 14 science-fiction...these were among the most common genres of B-picture output, so that the presumably forward technology of 3-D peculiarly looked backward as it breathed some life into a mode of production already thought dead" (328-9). This first 3D movie wave was short-lived, however, lasting less than two years. It was overtaken by the dispersal of widescreen technology, which was promoted on the basis that "you see without glasses". As Ray Zone notes, "[m]any films photographed in 3-D, like Alfred Hitchcock's *Dial M for Murder*, were released flat in 1954" (*3-D Revolution* 35). According to Scott Higgins, there was a longer but more diffuse second wave of 3D filmmaking from 1972 to 1978, which "was dominated by exploitation fare like *The Chamber Maids* (1972) and *Blonde Emmanuelle* (1978)" (196). The third wave of 3D made more of an impression on critics and audiences, signaled by the box office sensation of the low budget spaghetti Western *Comin' at Ya* (Ferdinando Baldi) in 1981, followed by *Friday the 13<sup>th</sup> Part 3* (Steve Miner) in 1982 and peaking in 1983 with *Jaws 3D* (Joe Alves) and *Amityville 3* (Richard Fleischer). Zone observes: "One of the technical virtues of the single-strip 35mm 3-D films of the 1980s was that wide-screen stereoscopic cinema became a general practice" (*3-D Revolution* 2). However, once again, this wave faded from the audience's view long before 3D could become a norm. Accordingly, William Paul defines 3D in his seminal 1993 essay, "The Aesthetics of Emergence", as "a kind of sport, an unexpected and always doomed mutation that by its very perversions defines the norms of the normative Hollywood style" (321). 3D's current, fourth, wave was inaugurated in 2004 by *The Polar Express* (Robert Zemeckis), which was also the first feature-length IMAX 3D movie, and later became firmly entrenched with the

worldwide success of *Avatar* (James Cameron) in 2009. Ten years later at the time of this writing, this 3D resurgence is still ongoing, fortified by its integration with digital production, post-production, and exhibition technologies.

Taking a wider historical perspective on stereoscopic 3D cinema, its prehistory can be dated back to 1838, when Sir Charles Wheatstone publicly showcased stereoscopy with hand-drawn imagery in a reflecting stereoscope in order to explain his theory of binocular vision (Zone, *Stereoscopic Cinema*; M. Ross, *3D Cinema*). Over a century later, nearly sixty years after the arrival of 2D cinema, the first 3D commercial theatrical release of *Bwana Devil* in 1952 only led to a short-lived 3D boom lasting no more than two years. Nonetheless, Zone suggests that this first 3D boom—

could be characterized as...an era of convergence—and not just because many of the dual-camera technologies of the time incorporated that optical feature into their stereo photography. It was also a brief stereo window in time in which the narrative canvas of classical Hollywood, 1.33 to 1 in aspect ratio, briefly converged with the amplification of depth. (*3-D Revolution* 31)

Notwithstanding the development of new stereoscopic technologies and techniques, the basic principles underlying 3D cinema have remained constant. In general, two parameters decide stereo dimensionality in stereography: *the interaxial* (used as a noun in 3D terminology), also known as Interocular Distance (IoD), and *convergence*:

IoD, also called the “interaxial”, refers to the distance between the two cameras recording a 3D scene. Pulling the lenses apart increases the volume of space and the roundness of represented objects. Convergence refers to the point at which the two images are perceived to fuse into a single representation. Images that appear to converge behind the screen surface are said to have positive parallax. Representations that appear to converge in front of the screen have negative parallax, so-called because the left and right images have crossed one another. (Higgins 198)

In 3D’s previous waves, the common “protrusion effect” was reinforced by the illusion of movement towards the audience in the negative parallax space. As Zone

comments:

The 1950s 3-D boom was built on dual-camera and projector technology. The 1980s 3-D cycle was built on single-camera and projector technology. Both of these formats exploited optical convergence, or toeing in, of the camera axes to produce negative parallax, with off-the-screen imagery coming out into the audience space. It was this visual effect that was the hallmark of the era of convergence, both as a promotional device and aesthetic leitmotif. (*3-D Revolution* 1-2)

The dual-camera system is based on two separate cameras, of which both the interaxial and toe-in angle are adjustable to produce different degrees of “protrusion effect”; while the single-camera system has two lenses, of which both the interaxial and toe-in angle can be altered in order to increase or decrease the three-dimensional effect. To magnify a “protrusion effect”, the usual way is to simply increase the IoD – the distance between the cameras – or widen the toe-in angle of the two cameras, or do both. Although Zone claims that the first 3D boom saw a slight reining-in of the “protrusion effect” (“[w]ithin the course of a year, Hollywood 3-D filmmakers had begun to make a more conservative and natural use of 3-D in film narrative” [*3-D Revolution* 61]), it nonetheless, remained a well-used device throughout all of the pre-digital 3D waves.

“We’ll throw things at the public until they start throwing things back.” Stated Jerry Ward, the producer of *Man in the Dark* (1953), which was the second 3D feature during the 1950s 3D boom, when he was queried by the press about the “emergence effect” (Zone *3-D Revolution* 61). However, Paul points out that this out-of-the-screen 3D signature effect disrupts the classical style of Hollywood storytelling: “...paradoxically, moving beyond the frame demands some notion that there *is* a frame to move beyond: emergence depends on a sense of violation for its effect. Perversely, by its insistence on the emergence effect, 3D, the process that most closely approximated the reality of our binocular vision, made us think about how that reality is constructed” (“The Aesthetics of Emergence” 335-6). As a result, the audience would be confronted by the “emergence effect” and further distracted from the narrative’s verisimilitude. Accordingly, based on his studies of the viewer’s cone of vision and the traditional Albertian window for linear perspectival viewing, Philip

Sandifer asserts that 3D's "protrusion effect," jutting out into the space shared by the audience, is essentially invasive. Sandifer argues that "3-D film violates the fundamental metaphor of the Albertian window in favour of one in which the material space of theatrical viewing and the act of spectatorship are actively engaged" (70). Because of this intrusion into the space of theatrical spectatorship, "[u]ltimately, 3-D film is not about the objects it depicts, but about the space in which it seems to project them" (78). Paul frames this issue as a dilemma for 3D cinema:

...as long as negative parallax is avoided, the window and resulting fourth-wall remain invisible, but as soon as the window is in effect smashed by the phenomenon of emergence, which 3D movies repeatedly did, the invisible becomes visible, and the fiction of a fourth-wall is laid bare by making apparent the plane that separates the viewer from the object. The window ends up constructing itself in its own deconstruction. (336)

In this regard, Sandifer's summary of the main problem with 3D's so-called "immersive delusion" derived from the "protrusion effect" is also worth noting:

...the objects in a 3-D film always exist not only in relation to diegetic space but also in relation to the actual viewer and the theatre in which the film is being watched. Rather than being immersive, 3-D film is profoundly bound up in an act of spectatorship whereby the theater, instead of disappearing, is even more conspicuously visible (69).

In a footnote to his essay, Sandifer comments, "Since this essay was written in 2008, the landscape of 3-D films has changed, most notably with the box office success of *Avatar* and the subsequent clear establishment of the third 3-D era, of which this article merely notes the imminent arrival" (62). His analysis thus does not account for more recent developments.

If we carefully observe 3D films made in recent years, we may notice that not only "the landscape of 3-D films has changed" but also the landscapes *inside* 3D films have changed enormously. By saying this, I mean that more and more 3D filmmakers have purposely avoided the "protrusion effect" which was often the most heavily promoted trademark of 3D in previous booms. Referring to the ongoing importance of protrusion-based effects, Paul asks: "Without emergence, what was

3D? But with emergence, what kinds of films could you make?” (331). As increasing numbers of innovative filmmakers have taken up the tools of 3D filmmaking, they have explored the creative potential of the “positive parallax” space, which refers to the space behind the 3D “window”, rather than relying on “eye-poking” effects associated with the “negative parallax” space in front of the screen. Contemporary filmmakers have experimented with this new dimension of “positive parallax” space to develop narrative and characterisation. In *Avatar*, James Cameron intentionally avoided using the “protrusion effect” to confront audiences directly; he preferred to take advantage of the unlimited behind-the-screen space to illustrate the fantastical planet of Pandora by integrating 3D devices with longer-duration shots and camera movement (Higgins 198-199; S. Rose 210, 217-219; Jockenhövel 9-10). Henry Selick used the same approach in his stop-motion 3D animation film *Coraline* (2009). These two landmark 3D films set new production norms for later digital 3D works, norms that are still followed by most digital 3D filmmakers today.

If we borrow Zone’s phrase characterising the 1950s and 1980s 3D booms as “the era of convergence”, the ongoing digital 3D resurgence may be called a “new era of convergence”, which does not mean optical convergence, but refers instead to a strategic convergence in which filmmakers exploit both the negative parallax and positive parallax space. Instead of merely sticking to the “aesthetic leitmotif” of spatial protrusion, contemporary 3D filmmakers have found more sophisticated ways of deploying “negative parallax” effects. During 3D’s “new era of convergence”, there is more of an emphasis on the positive parallax space, but also a strategic use of the negative parallax space, for the purposes of both narrative and spectacle. Certainly, the “protrusion effect” is still one of the most powerful visual devices for producing spectacle; however, “negative parallax” effects may also contribute to narrative objectives by cooperating with the primary deployment of “positive parallax” tactics.

### **Transforming 3D Aesthetics: From Emergence to Recession**

Because of its ups and downs in the past six decades, the recent return of 3D cinema faces an uncertain destiny, meeting with scepticism from both academia and the movie industry. John Belton points out the basic dilemma of digital 3D cinema:

If it is ever to become a norm, it must cease calling attention to itself... Yet, if 3D is to be 3D, it must necessarily exploit the phenomenon of emergence, violating the segregation of spaces that lies at the core of the experience of classic cinema. Digital cinema may have found its missing novelty phase in digital 3D, but it now finds itself trapped within that phase, like a fly in amber, unable to complete its innovation and diffusion. (194)

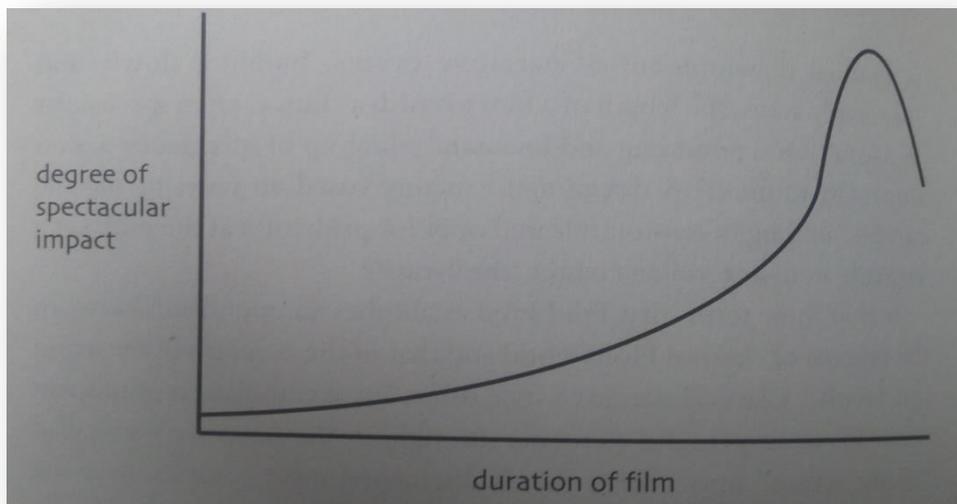
Obviously, relying on the “phenomenon of emergence” (also mentioned above as the “protrusion effect”, “effect of emergence”, “pop-out” or “poking-eye” effect) alone cannot convince audiences and critics to believe that digital 3D has been genuinely different from its predecessors and more than a novelty. Retrospectively, concerning the 1950s 3D boom, Zone admits, “It’s not surprising...there has been little perception on the part of film critics, as well as filmmakers, as to the artistic and narrative possibilities for stereo cinema” (*3-D Revolution* 59-60). He further comments: “The stereographic spectacle can have the unintended effect for the film storyteller of propelling the audience out of the narrative by calling attention to three-dimensional technology. At risk is the willing suspension of disbelief, that tenuous construct by which film storytelling is driven forward” (60). Sandifer concludes: “In the end, 3-D film is a medium of demos and, as a result, of gimmicks... This is the point of the technology: to re-establish movie theatres not as places where one can consume a visual narrative, but as places of spectacle and wonder” (78). For this very reason, both cinema theorists and 3D film practitioners are very concerned about the number of 3D films made during the early stage of this current revival that have exploited poking-eye visual tricks for audiences who are already numb to it (Belton, 187-195; S. Ross, 210-212, 219). James Cameron articulates this concern in his dismissal of the cheesy 3D approach used in the horror film *Piranha 3D* (Alexandre Aja, 2010) (Higgins 197-198).

On the other hand, there are many who are optimistic about 3D cinema’s future. Indeed, James Cameron himself is one of these 3D optimists and advocates. Back in 2005, Cameron said, “I think digital 3D offers an opportunity to do something as profound for today’s moviegoing audiences as the introduction of color and sound. This is the next big thing, and I think people are going to respond to these really high quality 3D images” (Belton 191). He proved his prediction correct four

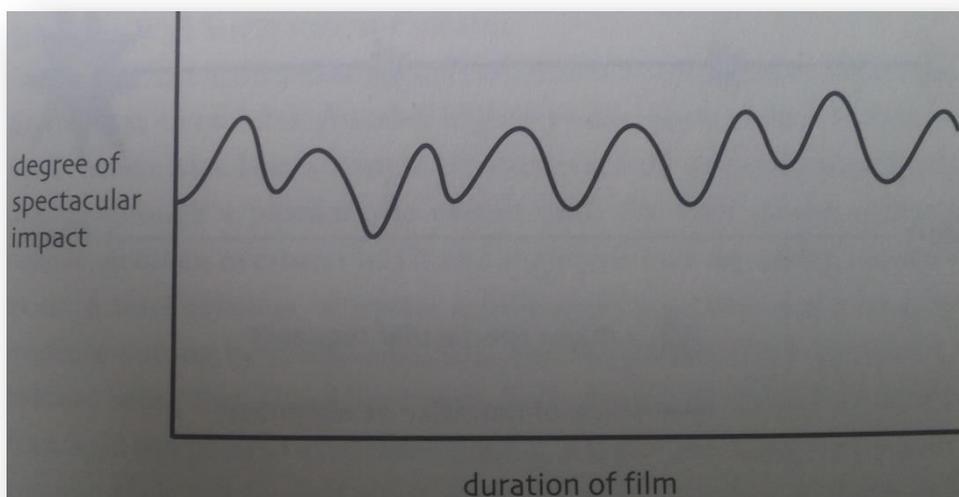
years later, when his epic 3D movie *Avatar* succeeded on the global market and broke the worldwide box office record. Since *Avatar*'s market hit in 2009, more and more 3D films have been produced and released by Hollywood and other countries around the world. Towards the end of 2011, in a *New York Times* article entitled "A Year of Disappointment at the Movie Box Office", the writer reported that "[r]evenue, for instance, has been propped up by a glut of 3-D films, which cost \$3 to \$5 more per ticket. Studios made 40 pictures in 3-D in the last 12 months, up from 24 last year, according to [BoxOfficeMojo.com](http://BoxOfficeMojo.com), a movie database" (Barnes, "A Year of Disappointment"). Not only have the numbers of 3D films increased steadily on a yearly basis since 2009, but more and more internationally renowned filmmakers have also tried their hand at 3D filmmaking. Two German art-house filmmakers, Wim Wenders and Werner Herzog, both made pioneering 3D documentaries in 2010, *Pina* and *Cave of Forgotten Dreams*, respectively. Hollywood masters such as Steven Spielberg, Martin Scorsese and Ridley Scott have all dabbled in 3D film productions, resulting in Spielberg's *The Adventures of Tintin* (2011), Scorsese's *Hugo* (2011), and Scott's *Prometheus* (2012). Ang Lee's 3D adventure, *Life of Pi*, was released at the end of 2012 and brought him the Oscar for Best Director in the following year. By the time of this writing, Scott's second 3D film *Exodus: Gods and Kings* (2014) and *The Martian* (2015) have completed their theatrical releases and been distributed in domestic formats. Peter Jackson's 3D fantasy trilogy *The Hobbit* (2012-14), the prequel to *The Lord of the Rings* trilogy, has been released in cinemas all over the world. Meanwhile, filmmakers around the world have begun to follow suit with commercial 3D films in countries such as France, Britain, Germany, Belgium, Poland, Argentina, India, and China (including Hong Kong), to name a few.

Although 3D has been used extensively within popular cinema over the past decade, it still tends to be recognized less as a vehicle for narrative than as a "cinema of attractions", a phrase that Tom Gunning first used to refer to the early film style that "dominate[d] cinema until about 1906-1907" (64). According to Gunning, this cinema "bases itself on...its ability to *show* something...this is a cinema that displays its visibility, willing to rupture a self-enclosed fictional world for a chance to solicit the attention of the spectator" (64). He goes on to suggest that "the cinema of attractions does not disappear with the dominance of narrative, but rather goes underground, both into certain avant-garde practices and as a component of narrative

films, more evident in some genres (e.g., the musical) than in others” (64). Attractions manifest themselves in all sorts of spectacular displays: from fantasy worlds in science fiction to intense battles in boxing films, furious chases in car-racing films, elaborate performances in musicals, and technologically advanced weapons and devices in the James Bond films. Examples of cinematic spectacle still appear as segments within contemporary film narratives. Moreover, spectacular segments in contemporary Hollywood blockbuster films seem to recur with more frequency and intensity than before.



**Diagram 1.1** Classic Hollywood narrative paradigm of a so-called ‘rising action’ through a single rising curve that accumulates unsolved dramatic and suspenseful elements all the way up to the plot climax to be resolved. (King 186)



**Diagram 1.2** The Roller-coaster model of narrative structures for contemporary Hollywood

blockbusters, in which narrative functions to hold together more frequent and intensive spectacular displays. (King 187)

Comparing the narrative paradigms of the one single rising curve in classic Hollywood period with the multiple ups-and-downs roller-coaster model for contemporary Hollywood blockbusters, Geoff King shows the greater intensity and frequency of spectacular segments in the latter. He further comments: “Spectacular moments here are both larger and more frequent, fragmenting the narrative. Narrative, in this roller-coaster model, becomes attenuate, its short segments cut off from one another and serving as little more than the glue that holds together a series of spectacular displays” (187). The roller-coaster structural model explicitly reveals the increasing importance of spectacle in contemporary Hollywood productions; however, Hollywood has never neglected the narrative impetus. According to King, although the “narrative dimension might not be drawn to our attention as much as the spectacular display...Traditional Hollywood narrative devices are designed usually to make a film flow effortlessly, rather than to claim attention in their own right” (202). These narrative devices serve as the “glue” to connect spectacular activities or exhibitions together and lay them out with interwoven narrative sequences. As a matter of fact, “[m]any spectacular blockbusters display carefully honed narrative structures designed not just unceremoniously to unload a series of great dollops of action-spectacle but to engage viewers and to increase the impact of the action and spectacle by locating it in relation to character and plot” (202). Therefore, the contemporary tactic of handling narrative and spectacle is much more complex and balanced than often acknowledged. Narrative and spectacle are not simply opposed to one another; rather they can be seen as interlocking or entwined. Hence, even the most overtly spectacular segments or devices tend to have some bearing on narrative motivations and events. In other words, the harmonious distribution and entwinement of the narrative and spectacular components in contemporary Hollywood blockbusters are as important as storytelling itself, whether in the conventional 2D or stereoscopic 3D format.

As a technological device, 3D has been long regarded as just another tool to produce eye-catching cinematic spectacle. Referring to the 1950s 3D boom, Zone notes: “...we should not be surprised to find that 3-D movies were considered within the industry primarily as a means of generating box-office revenue and, more

generally within the larger culture, as a spectacle that merely generated visual shock in the audience” (*3-D Revolution* 60). In this respect, 3D can be compared with earlier technological innovations such as sound and colour, each of which was seen initially as a cinematic “attraction” technique before becoming fully integrated into narrative filmmaking. When sound was first introduced to silent film in the late 1920s, Hollywood had been struggling with this “troubled” technology for years. Then studios realized that early sound movie audiences were more amazed by their favorite stars, who used to be mute on screens, beginning to speak than by the “authentic stories” enacted by the talking characters. Therefore, the studios deployed lengthy dialogues especially for the leading stars. Charles O’Brien writes,

sound cinema was frequently discussed in connection with developments pending in film color, 3-D, and television – all heralded as contributions to humankind’s ever-growing mimetic capability. But just as the association with ‘realism’ ensured sound cinema’s status as a technological achievement, it served to exclude it from the realm of art. Rather than transforming reality into art, sound films made ordinary reality salient in unexpected ways... (4)

O’Brien suggests that early sound film can be understood more in the sense of “a cinema of attractions” in which a direct and literal “reality effect,” perhaps paradoxically, interrupted film’s capacity to summon up other, narrative-based, modes of realism (and their attendant aesthetic qualities). This is similar to the situation accompanying colour’s introduction into filmmaking. Jesko Jockenhövel offers a useful comparison between early colour film in the 1930/40s and digital 3D nowadays:

Although it is certainly true that color served nonrealistic purposes from the 1930s until the 1950s and 1960s, I would argue that even before that, and especially in regard to traditions of pre-cinematic exhibitions and representations such as advertisements, in popular literature and newspaper supplements, color was always connected to the idea of spectacle rather than realistic traditions. (5)

He then quotes Edward Buscombe to support his argument:

color [...] was able to satisfy needs which realism could not. Were this not so, it is hard to see how, given its unrealistic connotations, it could have been introduced at all. Since the 1930s, however, color has become progressively absorbed back into realism, with the result that the audience's need for spectacle and for technological wonders has had to be satisfied by a succession of further technological developments: wide-screen, 3D, Sensurround and so on. (Buscombe qtd. in Jockenhövel 5)

Based on O'Brien's and Jockenhövel's arguments, it is likely for a new technology to serve as spectacle or cinematic wonder at the beginning, particularly when it is favoured by certain genres, such as sound being mainly employed in musicals in the late 1920s, colour being primarily favoured by musical and fantasy films in the late 1940s and early 1950s, and widescreen being initially adopted in historical epics and war movies in the early/mid 1950s.

For 3D, however, the case is somewhat different because it has already passed through a few short-lived or diffuse waves and is undergoing another round of resurgence, which is the longest to date by far. Nevertheless, Jockenhövel suggests: "It should be no surprise therefore that 3D is mainly applied to genres of fantasy, where it is used to create parallel or fantastic worlds and stunning visuals. In this way it influences genres and may even change and develop them in new directions by forming visuals that were not possible before" (12). His suggestion emphasises that 3D's spectacular contribution to fantasy film genres rests on its capability for "forming visuals that were not possible before". However, it seems that 3D may provide more than "fantastic worlds and stunning visuals" to contemporary filmmaking. Indeed, 3D's stereoscopic spatiality means that sometimes a shift in parallax can turn this old 'novelty' into a new vehicle for complex and innovative storytelling.

To some extent, the new 3D cinema's narrative potential is based upon filmmakers' increasing use of the positive parallax space. Jockenhövel notes that James Cameron in *Avatar* (2009) and Henry Selick in *Coraline* (2009) both restrain the "emergence effect" by diminishing the negative parallax effect in front of the screen, while in some scenes they purposely increase the interaxial and stress the "dimensional effects" in the positive parallax space behind the screen. Belton and

Higgins also pay attention to this fundamental strategic shift and applaud these two filmmakers' self-restraint and willingness to employ the technology in an innovative fashion: "Selick explains that he was inspired by *The Wizard of Oz's* (1939) shift from sepia to Technicolor: 'and so I thought in a more subtle way 3D would actually enhance the story with *Coraline* discovering what appears to be a better world'" (Selick qtd. in Higgins 205). As I will go on to argue in subsequent chapters, the more subtle use of 3D effects within the positive parallax benefits both spectacle and narrative, as innovative filmmakers such as Cameron, Selick and Scorsese have demonstrated. Meanwhile, the negative parallax space has not been completely discarded, but filmmakers have tended to use it more sparingly than in the past, and in ways that produce distinctive narrative and spatial effects. Higgins gives a vivid analysis of the climactic screening scene in Scorsese's *Hugo*, which is a quintessential example of using effects in the negative parallax space to imply the ontological distinctions between 3D and 2D space:

A fleeting avant-garde exercise, Scorsese's image challenges distinctions; the moon appears in a space outside of the diegesis, directly addressing the viewer, while it is resolutely anchored to and placed within the film's world. It is a fitting analog to our historical moment, in which aesthetics confront a new visual technology, and popular films struggle with the very definition of cinematic space. (Higgins 207)

Here, Higgins draws out the aesthetic potential of 3D technology for filmmaking, especially in terms of defining the cinematic space differently from that of 2D filmmaking. As illustrated by his analyses of *Coraline* (2009) and *Hugo* (2011), and by the increasing use of 3D by leading filmmakers, digital 3D technology has had a fundamental impact on both cinematic attractions and narrative aesthetics. In particular, the trend of shifting emphasis into the positive parallax space while making strategic use of the negative parallax space has distinguished the current 3D boom from the previous waves by appearing to suggest new narrative possibilities. Higgins calls it "a sustainable aesthetic": "The depth-oriented stereo space of *Coraline* may help point forward to a more sustainable 3D, which in previous waves, has crashed on the rocks of protrusion" (206). Inspired by his notion, I refer to this aesthetic trend of

employing a “receding strategy” to explore the positive parallax space as the “Aesthetics of Recession”.

By concentrating my research focus on stereoscopic narrative values in contemporary digital 3D cinema and analysing the fundamental strategic shifts as embodied in representative 3D cinematic works, I will attempt to theorise the “Aesthetics of Recession”, which exploit the positive parallax space behind the 3D screen. Moreover, I will argue for their significance in establishing a potentially new kind of stereo audiovisual language differentiated from traditional 2D filmmaking, as well as from past tendencies in 3D cinema. This “Aesthetics of Recession” is based on the “receding tendency” in contemporary 3D filmmaking and discloses itself through filmmakers’ effective explorations of both cinematic spectacle and visual storytelling in the positive parallax space. Although the “Aesthetics of Recession” can be seen as opposing the ‘protrusion effect’ rooted in the negative parallax space, the two are not completely opposed to each other. On the contrary, the “Aesthetics of Recession” may be used to complement and support occasional incursions of 3D imagery into the negative parallax space. By integrating itself with the protrusion effect, the “Aesthetics of Recession” not only turns this once “exploited” visual gimmick into a productive “dimensional effect” for narrative, it also contributes to a new kind of stereoscopic 3D cinema language, which harnesses 3D effects to produce distinctive narrative devices and patterns. Such a language needs to be understood in relation to the integration of 3D techniques with digital special effects, CGI and digital animation; indeed, the imbrication of these technologies informs and underpins much of my discussion in the following chapters.

### **Stereoscopic Narrative and 3D Realisms**

Based on previous examples of sound and colour, new technologies often serve spectacle first and then narrative (Buscombe, 1992; O’Brien, 2005; Jockenhövel, 2012); or, as Miriam Ross states: “The situation is further complicated by the way in which new technologies often enter as attractions first and realist mode later” (*3D Cinema* 80). In this regard, David Bordwell’s approach to classical Hollywood narrative formula and storytelling theories is very useful for examining 3D’s evolution. Bordwell, following Russian Formalism, develops four types of motivations for formal elements: compositional, realistic, artistic, and transtextual

motivation (“Classical Hollywood Cinema” 18). According to Bordwell, compositional and realistic motivations indicate a greater interest in narrational goals, while artistic and transtextual motivations are devoted to style and genre distinctions. If a cinematic technique is employed mainly for compositional or realistic motivation, it may be regarded as a powerful narrative device; whereas if a technique is merely used for artistic or transtextual purpose, it tends to be viewed as a formal component to define an artistic style “foregrounded to an unusual degree” or as a “generic enhancer” to signify a certain genre.

Based on Bordwell’s “four types of motivations for formal elements”, Jockenhövel compares the situation of early colour film in the 1930s and 1940s with 3D today, finding a number of parallels. He argues that Buscombe’s statement regarding early colour can be “applied word for word to 3D today”, suggesting “two possibilities” for 3D: firstly, like colour in its early days, 3D “must signify luxury or spectacle”; secondly, like colour in early Technicolor pictures, 3D today “operates as a celebration of technology” (Jockenhövel 12). Although Jockenhövel admits that 3D is not limited to the above two functions, he concludes that these are the most powerful motivations for 3D and both motivational tendencies point to a small range of genres such as fantasy, action, and horror (12-3). In Bordwell’s terms, then, 3D’s motivations would thus appear to be artistic and transtextual.

However, if we compare the films that favoured 3D in previous booms and those produced in the current resurgence, we see that the range of genres has already widened substantially. For example, many 3D films made during the first boom in the early 1950s were Westerns and science fiction films, with the exceptions including Hitchcock’s *Dial M for Murder*, which is a suspense drama, and musicals like *Kiss Me Kate* (George Sidney, 1953). During the second and third 3D booms of the 1970s and early 1980s, 3D was used for more genres such as thriller (*The Chamber Maids*, Romano Scavolini, 1972), martial arts action (*Magnificent Bodyguards*, Lo Wei, 1978), spaghetti Western (*Comin’ at Ya*, 1981), and even softcore adult films (*The Stewardesses*, Alf Silliman Jr., 1970, *Blonde Emmanuelle*, Stephen Gibson, 1978), as well as horror. By the time of Jockenhövel’s writing (2011), there had been already more genres covered in the new 3D wave than in the earlier ones altogether; these included fantasy, adventure and action, with the most prominent genres being science

fiction (e.g. *Avatar* and *Transformers: Dark of the Moon*, Michael Bay, 2011), historical drama (*Hugo*, and the martial art action *Flying Swords of Dragon Gate*, Hark Tsui, 2011), as well as many 3D animations. 3D feature documentaries also emerged, with *Pina* (2010) and *Cave of Forgotten Dreams* (2010) being the two most distinguished. Since 2012, with more and more eminent filmmakers taking up 3D filmmaking, more diverse genres have been produced in 3D including adventure drama (*Life of Pi*), romance drama (*The Great Gatsby*, Baz Luhrmann, 2013), historical disaster (*Pompeii*, Paul W.S. Anderson, 2014), biblical epic (*Exodus: Gods and Kings*, Ridley Scott, 2014), and racecar action (*Need for Speed*, Scott Waugh, 2014), just to name a few. Whereas 3D was a strong predictor of genre in the first 3D boom, since then its association with specific genres has been gradually less evident. In Bordwell's terms, 3D is now associated not only with "artistic" flourishes and "transtextual" markers of genre, but is increasingly driven by compositional and realistic motivations that serve narrational goals. At the same time, however, 3D's effectiveness at producing spectacle has been enhanced and amplified, by integrating it with digital technologies (such as CGI and digital compositing).

3D has also been deployed alongside high frame rate (HFR) capture and multi-channel sound, and has also been rendered via new conversion processes (which can produce 3D images out of 2D source material). To return again to Bordwell's taxonomy of motivations, much of the discussion of such technologies revolves around questions of "realism". For Julie Turnock, "cinematic realism is a historically changeable style and set of codes that producers have long promised can provide impossibly vivid experiences" (31). Historically, the meaning of "cinematic realism" is complex and its connotations overlapping as Miriam Ross argues:

Any discussion of realism is complicated by the fluid, permeable and changeable nature of the term. Although scholars have emphasised realism in the cinema both as an attempt to realistically portray the pro-filmic and as an artistic convention... public and press discussion concerning cinema, particularly 3D cinema, frequently conflates realism, realistic presentation, illusionism, naturalism, and other interlinked terms. (*3D Cinema* 76)

Moreover, discussions of realism are often shaped by the experiential, psychological, and cognitive reactions of individual audience members or writers. In the case of 3D,

physiological factors play an important role, as evidenced by the varying responses to 3D glasses. If a viewer is discomforted by wearing a pair of 3D glasses, the “reality” of the diegetic world is easily broken for her/him, thus undermining any kind of cinematic realism. With this variability in mind, Miriam Ross goes on to set up the framework of what she calls the “new realisms” of stereoscopic 3D cinema: “For this reason, my own discussion of 3D cinema is cognisant of these overlapping terms and tries to drive a path through their different uses in order to productively understand how conceptual understandings of realism help viewers find meaning in the way in which stereoscopic visual fields operate” (76). In my following discussion, I will take into account Miriam Ross’s “reception-oriented” understanding of “cinematic realism” but will primarily frame these multivalent 3D “realisms” within three modes: realistic presentational style, narrative authenticity or verisimilitude, and narrational and spectacular immersion. I will also explore the connections with parallel technological processes: stereoscopic sound, 2D to 3D conversion, and HFR video capture. This, in turn, will pave the way for my in-depth comparison of 2D and 3D visuality in the next chapter.

Although Miriam Ross does not explicitly give a definition of what she proposes as the “new realisms” of stereoscopic 3D cinema, her following statement provides a helpful perspective:

I have outlined the way that stereoscopy’s tactile and deep space qualities, and the embodied relations they produce, change our sense of depth in cinema, creating viewing relationships which cannot be found elsewhere. The common ways of perceiving these relationships, developed through frameworks of spectacular attractions and enhanced realism, often seem contradictory but equally point to the fluid, interchangeable viewing states involved in 3D cinema, where viewers are often immersed in and aware of the optical illusion produced in front of them. (*3D Cinema* 93)

Ross’s notion of the 3D field screen, which is “an evolution of the traditional and haptic [2D] screens” (23)<sup>2</sup>, is very important for us to understand how the

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<sup>2</sup> Miriam Ross mainly draws on Laura U. Marks’s concept of the “haptic cinema screen” and develops it into her notion of the “3D field screen”, in order to illustrate 3D cinema’s hyper-haptic visuality, based on Marks’s delineation of “haptic visuality” on the flat screen:

stereoscopic space is constructed within a spatial duality (constituted by the spaces of the negative parallax and the positive parallax, respectively), and how these elements, as a whole, play out for stereoscopic storytelling. The 3D window (zero parallax screen) not only lays a thin border between the positive parallax and negative parallax space, it also provides a floating nexus that mediates between them and a crossable window for characters and objects travelling through them. The 3D field screen (which consists of the 3D window, together with the negative and positive parallaxes) not only has the tendency to move the objects towards the audience and engulf them spatially, but also tends to bring the audience into the visual field (M. Ross, *3D Cinema*), even though they are often “aware of the optical illusion produced in front of them”. The key term “immersion”, “a reoccurring term that is used and overlapped with discussion of realism” in 3D cinema (89), is rarely adopted to describe realism, naturalism, or realistic representation in 2D media presentation, because such immersion seems to work independently of the codes and conventions of realism. However, “immersion” may be looked at as one mode of the stereoscopic “new realisms” that M. Ross proposes. Furthermore, as Turnock points out, realism itself is historically variable:

Historical examples of films lauded for various kinds of realisms, but whose styles of realism we can now see through, could include *Bicycle Thieves* (1949), *Nashville* (1975), or *Saving Private Ryan* (1998), to name a few. We see through them not, as many assume, because our technology has gotten “better,” but because the codes and conventions of realism have changed. (44-5)

Turnock employs “this historical contingency” to present “...a starkly different model of the representation of cinematic ‘realism’” to argue why the effects of digital HFR applied in *The Hobbit* (apparently Episode 1) are, for many, too “real” to be “realistic”. As she concludes: “In light of contemporary codes of media presentation of realism, HFR helps us see our prejudices and preconceptions about how different moving media image look, but also how they are ‘supposed’ to look different from one another” (49). Later in this section, I will use *The Hobbit: Episodes 2 & 3* as

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The haptic cinema screen, as defined by Marks, is distinct from the traditional screen in that it demands a different type of engagement. It constructs a fractured visual statement by refusing to position clear signs and relations between objects on its surface, which in turn draws attention to the images’ textured and tactile quality. The screen speaks out to the audience and invites participation by vexing and disturbing our understanding of its content, in this way drawing us closer to its surface. (M. Ross, *3D Cinema* 22-3)

examples to argue that digital HFR capture technique complements stereoscopy's "new realisms".

Drawing on Miriam Ross's notion of stereoscopic "new realisms", I will outline three reception-effect-based modes of "cinematic realism" in the 3D context. The first 3D realism can refer to the use of naturalistic and unobtrusive styles/methods, mainly represented by *Pina* (2010), *Cave of Forgotten Dreams* (2010), and other 3D documentaries such as *U2 3D* (2007), *Katy Perry: Part of Me* (2012) and *Swan Lake 3D* (2012), which are largely presentational, showing artists' live performances on stage. Secondly, 3D realism can mean the narrative authenticity, to which 3D techniques can contribute by assisting in the construction of dramatic space, a feature illustrated by the fact that many 3D films made in this current wave are within the drama genre. *Hugo* (2011), *Life of Pi* (2012), and *The Great Gatsby* (2013) are thus representative works. In most cases, this mode of "3D realism" is what Hollywood filmmakers are referring to when they discuss realism. It describes the lifelike impression they attempt to produce through their storytelling. Finally, the third mode of 3D realism is defined by "immersion", which may be divided into two categories: narrative immersion and spectacular immersion. Each category may imply the audience's immersion in illusionary locales and events, which are impossible to reach or experience in the real world, yet with a different emphasis on narrative verisimilitude and spectacular pleasure, respectively.

Nonetheless, as we discussed earlier, since spectacle and narrative segments in contemporary filmmaking, especially Hollywood blockbuster films, are more and more intertwined and interlocking, narrative immersion and spectacular immersion are often interwoven with each other. For example, the outer-space weightlessness and fight for survival in *Gravity* (2013), the epic historical events in *Exodus: Gods and Kings* (2014), and the improbable adventures in the projected theme park of *Jurassic World* (2015) all belong to this mode of 3D realism. Narrative is communicated via the experience of immersive spectacle. At the same time, the immersive mode sometimes points to sensationalism, which can be viewed as the extreme of realism, such as the extreme visceral graphics of violence in *Dredd 3D* (2012) and the erotic sensual sex scenes in *Love 3D* (Gaspar Noé, 2015), although this sort of sensational imagery is still fairly uncommon in 3D. Next, I will analyse the

three modes of 3D realism with emphasis on the latter two (3D verisimilitude and immersion), linking them to a number of 3D-related technological issues: stereoscopic sound, 2D to 3D conversion, and the digital HFR capture technique.

I start with the first mode of realistic presentational styles/methods, which are mainly embodied in the form of 3D documentaries so far. Stereoscopic sound also contributes to this mode of 3D realism, although, I will not be undertaking an extended analysis of sound, given that my primary concentration in this PhD research is on 3D imagery. Undoubtedly, the immersive sound system currently promoted by the movie industry – Dolby Atmos mode (9.1 or 11.1 surround sound system) – attempts to enhance the audience’s dynamic experiential enjoyment by complementing the spatial abundance of the visual spectacle. However, as Herbert Zettl points out, surround sound is not very effective in marking Z-axis positions, either in front or in back of the 3D window (157). In order to solve this problem, the Dolby Atmos system lays out multiple pairs of speakers along the auditorium aisle under the audience seats. However, as Zettl suggests: “[t]o define sound more precisely along the Z-axes of 3D presentations, we need binaural sound... captured by two microphones that replace the ears on a dummy head, much like our actual hearing” (157). This gives the audience a more “realistic” auditory experience by mimicking aspects of the real world, but it also brings on a new complication: the audience has to wear headphones that carry separate soundtracks for the left ear and the right ear in order to hear binaural sound. Although the binaural sound might benefit and even encourage some 3D filmmakers to pursue the possibilities of “naturalistic” filmmaking, wearing headphones to view 3D films would become a real challenge for the audience, particularly those who have already been troubled by 3D glasses. Nonetheless, such issues highlight the mode of 3D realism given over to reproducing “real-world” effects. 3D documentaries in particular highlight the capacity of the format to provide audiences with heightened engagements with real-world settings.

However, it is important to note that even 3D documentaries do not depend exclusively on a naïve “reality effect.” Films like *Pina*, rather than “naturally” documenting artist performance events in real spaces, also work to “construct” such performances in depth-oriented onstage spaces. In this respect, it also becomes appropriate to see such films as examples of the second mode of 3D realism, which

relies not on a literal reproduction of the real but instead works to establish a “lifelike” effect. As a matter of fact, this kind of intentional “staged depth” can be even traced back to a few 3D musical films produced during the first 3D boom in the early 1950s.

As mentioned earlier, within a year of the first 3D boom’s inception, Hollywood 3D filmmakers began to use 3D in a more controlled and measured way to support film narrative (*Zone, 3-D Revolution* 61). In music and dance numbers, constructed depth was used to explore “onstage” space and integrate it with spectatorial space. For example, in the 3D musical *Kiss Me Kate* (1953), Director George Sidney used a long and narrow stage stretched into the audience space, on which a solo singing number from the protagonist Fred Graham (Howard Keel) was carried out entirely above the seats. The camera angle for the number was mainly positioned at the side of the (diegetic) theatre, so that we see Graham sing in the foreground while audience members, visible in the deep back planes, look at his performance. In this case, as *Zone* puts it, “The audience of the stereoscopic film itself is symbolically represented by the audience within the film” (41). As Graham finishes singing, the camera tracks with him as he retreats to the main stage. This “stretched” stage design not only accentuates the spatial depth of the performing domain and further extends the narrative space of the onstage musical, but also illustrates the width of the theatre and fuses the two (performer’s and spectator’s) spaces into one pictorially, providing an analogue for 3D cinema’s bridging of screen space and theatrical space.

In another dance number, a row of stone poles are deployed along the Z-axis lining one side of the stage, so that the three pairs of performers can dance and sing back and forth along the row of poles, or move laterally through the space between the poles to the centre of the stage. Onstage depth is thus underlined by the row of poles as constructed depth references. Here, the verisimilitude that the onstage depth presents is associated with highly artificial arrangements of cinematic space. This kind of formalized spatial organization helps to underline the fact that 3D is an artificially induced optical illusion instead of a natural visual process (I will further explore the illusory nature of this process in the next chapter). Nonetheless, this artificially enhanced dimensionality is instrumental in building up a sense of spatial,

and by extension narrative, engagement. As I will go on to argue, this artificial “reality effect” has become the basis for deploying and orchestrating a range of narrative relations and devices. Indeed, as I have already suggested, the most recent wave of 3D cinema is characterised by an increasing number of films within the drama genre, as well as the conversion of 2D drama films into 3D versions, particularly following the successful release of *Titanic 3D* in 2012.

This trend has substantively impacted on the digital 3D filmmaking status quo, as more and more 3D films are made with a mixture of real 3D camera capture (native 3D), 2D to 3D conversion (post-processed 3D), and CG (computer graphics) stereoscopic rendering – so called “hybrid 3D productions”. Some worry that post-processing technology will eventually diminish 3D cinema due to the poor quality of many converted works. However, a series of “Stereo-Film-Quality Analysis Reports” released by the Graphics and Media Lab at Moscow State University has claimed that the conversion technology “is evolving at a very fast pace and the quality of the experience delivered by 2D-3D conversion is constantly rising. In some cases, use of 2D-3D conversion is beneficial (e.g. “hard-to-shoot” scenes and films containing a significant amount of computer graphics)” (Voronov, et al., “Methodology”). The reports elaborate some recurring artefacts that cause visual discomfort in 3D films, including Cardboard Effect, (Edge) Sharpness Mismatch, Horizontal and Vertical Disparity, and Colour Mismatch<sup>3</sup>.

Nonetheless, Sebastian Knorr, et al. declare: “It is a fatal mistake to believe that shooting directly with a stereo camera rig is easier, less expensive, and causes fewer errors. In fact, artifacts resulting from shooting with stereo camera rigs can be greater than those created by a 2D-to-3D conversion process” (78). M. Ross also notes: “Often post-production conversions are able to control similarity (particularly colour and alignment) between images more effectively than native productions” (“...the Ugly, the Bad and the Good”). This means that 2D to 3D conversion technology, after years of rapid development, may become instrumental in producing 3D effects by virtue of its ability to eliminate common artefacts and rectify technical errors.

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<sup>3</sup> VQMD3D Project: Report 3 and Report 5 on 3D Video Quality Analysis issued by MSU Graphic and Media Lab on August 28 2013 and April 11 2014, respectively. Web. Accessed 1 August 2015. <http://compression.ru/video/vqmt3d/report3/>, <http://compression.ru/video/vqmt3d/report5/>.

Although original captured 3D and 2D-converted 3D are usually regarded as two completely exclusive processes, in recent years, the two technologies have been used together in increasing numbers of 3D films. Nowadays, it is very hard to find a 3D film that is purely made based on digitally-captured live-actions without any conversion techniques or CGI/VFX involved during post-production. As Michele Pierson pointed out a decade ago:

The same systems that are used for digital editing are also used to produce a wide variety of visual effects, from wire removal, color correction, and digital compositing to the construction of complex three-dimensional objects and environments. The goal of this type of visual effects production is to integrate the desired effect seamlessly into the cinematographic space of the film, the aesthetic parameters of which vary according to each film's budget, style, and genre. At the other end of visual effects production is the CGI effect. (144-5)

Therefore, an understanding of stereoscopic cinematic aesthetics should include not only all the artistic devices based on two-camera capture, but also a variety of post-processing technologies as well as three-dimensional CGI and VFX techniques, in which the basic principles of the two-camera mode are mimicked by virtual stereoscopic CG camera rigs. The stereoscopic images produced by each of these techniques are implicitly or explicitly designed to mimic the visual apparatus of the two-camera configuration, which in turn attempts to approximate human binocular vision. Ultimately, post-processing and CGI/VFX allow 3D filmmakers to undertake more complex manipulation and ramification of stereoscopic imagery (Sylwan, MacDonald, and Walter, "Stereoscopic CG Camera Rigs").

Such technical processes are dedicated towards establishing a sense of onscreen verisimilitude for 3D imagery (in particular, by rendering spatial relations legible, convincing and "lifelike"). As I will go on to argue, such techniques have made possible new types of narrative approaches and effects. Maybe the appropriate question to ask now is therefore not which films are examples of "pure" native 3D as opposed to post-processed 3D, but how 2D to 3D conversion technology is being integrated with conventional 3D processes and digital special effects to enhance stereoscopic verisimilitude. In any case, given the technical overlaps and common aesthetic goals of these various processes, my subsequent analysis will not distinguish

between genuine, converted and hybrid 3D, nor attempt to target any one of these production modes, but will rather approach them under the united category of “digital stereoscopic 3D cinema”.

Before moving beyond post-processed 3D, however, I would like to highlight the way in which it illuminates more general features of 3D spatiality. When analysing automatic 2D to 3D video conversion, Liang Zhang et al. state: “It is worth noting that most of the methods based on...intensity and color related depth cues do not attempt to recover the depth in the scene, but to provide a S3D image pair that is perceptually acceptable with an increased sensation of depth with respect to the original 2D images” (376). In other words, 2D to 3D conversion aims to increase the depth of the illusionary space, rather than recovering the depth of the profilmic space represented in the original 2D images. This fact prompts us to consider the larger context of 3D illusion, such as how the illusionary stereoscopic space is constructed and what narrative values it engenders with its impression of increased depth. Through constructed illusionary space, how does a unique stereoscopic narrative perspective arise and impact on both storytelling and the audience’s viewing experience?

These questions lead us to the third mode of 3D realism – realism as experiential and narrative “immersion”. Discussing the use of 3D in his erotic “sex odyssey” *Love 3D* (2015), filmmaker Gaspar Noé has said “that he wanted his film to offer an immersive experience of sex, and coupled with his existing fascination with 3D, he decided to make the shift into the other dimension. ‘I felt that 3D would allow the viewer a greater sense of identification with the lead character and his nostalgic state,’ he explained” (Webb, “Revealed: the 3D sex odyssey”). Although I agree that 3D can engender immersive effects for the audience in terms of both narrative and spectacle, I would say that the emphasis in Noé’s *Love 3D* is primarily on the latter: that is, the film aims primarily to produce sensory overload rather than engage audiences with a cohesive narrative. However, the dominant trend in popular 3D cinema favours a more holistic and balanced union of spectacular and narrative immersion: audiences are addressed via sensory immersion, but also via the orchestration of narratively significant events, characters and affects.

3D immersion is often associated with situations or activities that we may

never have experienced in reality but which still feel credible and involving: the form of “realism” we are discussing here might therefore be seen as a type of “stereoscopic hyper-realism”. This distinctive hyper-realism depends not on rapid editing or an array of different camera angles (which is often how 2D cinema attempts to create immersive effects in the era of “post-continuity” aesthetics), but rather combines 3D’s depth effects with the use of deep focus, long takes, and the careful integration of digital special effects. The stereoscopic hyper-realistic mode can combine narrative and spectacular immersion. Although Miriam Ross puts realism and immersion into two different modes<sup>4</sup>, she recognises, “it is possible to combine a variety of 3D visual fields without hampering audience investment in their realist attempts. In particular, immersion in their visual fields can operate as a process where viewers are both drawn towards the film and find the film coming towards them” (*3D Cinema* 93).

Many of the other technical developments that have occurred alongside 3D have, to a great extent, enhanced its association with an immersive, “hyper-realistic” aesthetic. However, recent responses to some of these techniques have illustrated the boundaries between different types of realism. It seems that technology can make cinematic illusion too real to be realistic, as evidenced by the some of the negative response to High Frame Rate (HFR) capture, which was amalgamated with digital 3D in Peter Jackson’s *The Hobbit* trilogy (2012-14).

Simply put, HFR defines an image capturing technique that records at 48 frames per second (fps) or even higher, rather than the customary 24 frame-per-second cinematic standard. HFR is not a completely new cinematic technique, as Turnock notes: “High frame rate filmmaking, from a studio-era special effects technique to ‘the future of cinema’ in the 1970s and 1980s, as well as its current resurgence in *The Hobbit: An Unexpected Journey* (Jackson, 2012), has been promoted as a way to “improve” and enhance the cinematic experience” (30). As the 3D Camera Supervisor on the first episode *The Hobbit: An Unexpected Journey*, Gareth Daley talks about his 277 shooting days working with HFR:

It was a very natural filmmaking process. There is talk of even going up to 120fps. Who knows where it will stop but projection technology is only just catching up in terms of the flexibility of what they can project at. In terms of

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<sup>4</sup> However, Miriam Ross places her analysis of “Stereoscopic realism” and “Immersion” in the same chapter under the title “New Realisms” in *3D Cinema: Optical Illusions and Tactile Experiences* (Palgrave Macmillan, 2015).

sound, 48 is a multiple of 24, so technology wise, with other peripherals coming into production, that was a reason to go 48 but I think in the future – it won't stop at 48. However, you are talking double the frame rate we have seen in the past 80 years so it's a huge step. (Daley, "3D Camera Supervisor")

Responding to the question of whether he likes the "look" of HFR, Daley continues: "Personally, after spending many hours watching rushes every week, I love it. It's the right ingredient to make 3D work because you do lose that entire flicker. It makes the 3D a lot more comfortable to watch" ("3D Camera Supervisor"). During their two years filming *The Hobbit Episode 1*, the crew used 48 RED EPIC cameras on 17 3ality Technica rigs. Ex-Red Camera Company Chief Ted Schilowitz comments as follows on the union of HFR and 3D:

At this point, 48 fps is a design choice for the 3D experience. The higher the frame rate, the more natural the 3D experience will be in terms of any kind of flickering and problems that we have with lower frame rates in 2D, so it's a technology choice. I think we have yet to determine what the high frame rate 2D experience will be. I think that is something that will be established over time as people tune themselves to a higher frame rate experience and start looking for movies that don't look like old fashioned movies. I think we are on an interesting cusp. (Schilowitz, "Be open minded")

Schilowitz exhorts people to "be open-minded" to this technology: "Pictures at home now can rival cinema so cinema has to be better and that's what Peter is looking at with 48 frames and Cameron with 60 frames. We want bigger, more immersive experiences when we go out to pay for a movie. It needs to be more like a ride than a movie and that's what people want" ("Be open minded"). Nonetheless, not all the people out there want the "immersive experiences" that Schilowitz talks about, at least not those presented via HFR effects in *The Hobbit (Episode 1)*.

Posted online, photographer Vincent Laforet's well-known article commenting on the first episode *The Hobbit's* HFR adoption represents the main critical points from HFR naysayers that I summarise here:

1. "*Monday Night Football*" viewing experience, not cinematic experience;
2. more like watching a BAD reality TV show or video game;
3. all the magic is lost, no longer under the spell;

4. light loss and colour shift experienced when 3D glasses still existing;
5. difficult to engage with the narrative and characters, the reason is:
  - A. the audience are lost in the too “hyper real” imagery and cannot focus on one single object;
  - B. the audience are visually overwhelmed so can’t pay attention to the dialogues;
  - C. costumes and make-ups look so real and artificial that they distract audience attention from the story itself (Laforet, “The Hobbit: An Unexpected Masterclass”).

Turnock also points out HFR’s “aesthetically displeasing effect in which the diegesis looks too much like a film set or real event, rather than a fully realized imaginative world” (44). But she predicts that HFR’s may ultimately demonstrate longevity and concludes: “HFR shows the extent to which many are deeply resistant to the media conversion, and how we are used to, and in many cases emotionally invested in, cinema’s particular pane of glass” (49-50). In fact, after viewing *The Hobbit: Episodes 2 & 3* and comparing them with the first episode, I observed that the above-mentioned “artifacts” have substantially reduced and the quality of the resulting immersive hyperrealism has improved.<sup>5</sup> More importantly, HFR adopted in *The Hobbit* trilogy has substantially increased movement smoothness by getting rid of strobing and judder during action sequences, which used to be bothersome for the audience in viewing 3D films. Thus it is fair to declare that after years of technological modification and refinement, digital HFR capture technique, at the very least, complements one of stereoscopy’s “new realisms”. In other words, the immersive “realism” of 3D has been further enhanced by uniting it with HFR, a parallel digital technology that also seeks to immerse audiences in the cinematic image.

## Conclusion

In summary, this project will focus its investigation on stereoscopic 3D narrative, based on its unique rendering of spatial depth and capacity for generating new modes of “3D realism”. In the next chapter, I will compare 2D and 3D visuality, using specific films as case studies, in order to pave the way for the primary narrative

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<sup>5</sup> There was a purposeful paring back of the HFR in *Hobbit II* by Peter Jackson in response to widespread criticism of the first episode (The Hobbit: The Desolation of Smaug, Production Diary. Video Blog. 5/12/2013. Youtube. Accessed 3/6/2016. [https://www.youtube.com/watch?v=tv1imkOqHZ8&list=PLxEb7OJne0\\_cKWPIF8srU4D-SReVF-ybn](https://www.youtube.com/watch?v=tv1imkOqHZ8&list=PLxEb7OJne0_cKWPIF8srU4D-SReVF-ybn)).

discussion in the latter chapters, which will build on my discussion of the three modes of “3D realism.” I will focus in particular on the latter two modes, 3D verisimilitude and 3D immersive hyperrealism, showing how they are integrated within narrative cinema and orchestrated according to the increasing dominance of the new “Aesthetics of Recession”.

I would like to transition to the next chapter by citing a remark from John T. Rule, who was a 3D expert and made the following statement in 1953: the “three dimensional world is a plastic world. It is a world of sculpture rather than of painting” (Rule qtd. in Zettl, 158). How do we understand the 3D world as a “plastic”, sculptural world? What are this “plastic” world’s primary features and fundamental differences from the 2D world of painting? In the next chapter, I will make an ontological comparison between 2D and 3D visuality and attempt to answer these questions.

## Chapter 2: From “Redemption of Physical Reality” to “Recreation of Perceptual (Hyper)reality”

(S)tereoscopic cinema gives us a glimpse into a world whose volumetric properties exceed our own in terms of their dynamic range, their vividness, and their infinite scalability. Rather than mimicking natural sight, it offers a heightening of vision, a glimpse through the looking glass into an immersive domain that all visual effects, in one way or another, have proffered so beguilingly to viewers. (Stephen Prince, *Digital Visual Effects* 219-20)

In this chapter, following the 3D realisms discussed in the previous chapter, I will further my argument by comparing 3D and 2D visuality, with a focus on 3D’s distinctive “reality effect” and the consequential “artificial” authenticity entailed by the unique stereoscopic two-camera visual mechanism. Since the term “realism” applies to a historically varied set of codes and conventions that are constantly reinterpreted and reconfigured by different filmic styles or movements, I will approach it within the framework of the three modes discussed in Chapter 1: namely, realistic presentational style, narrative authenticity or verisimilitude, and narrative and spectacular immersion. More particularly, I will be focusing on the latter two modes: narrative “verisimilitude” is tied to the conventions of Hollywood fiction films, which use sophisticated plot construction and spatial composition to induce our phenomenological and experiential sense of the “real”; while “immersion” refers to the ways in which spectators become integrated into the ‘world’ of the film, both through narrative involvement and stereoscopically-produced hyperrealism. Most of the 3D films I analyse in this chapter make use of a “reality effect”, which is based on (re)constructed illusory stereoscopic space and integrated with CGI and digital special effects. I argue that this (hyper)realistic spatial regime has provided the ground for 3D cinema’s deployment of narrative techniques. That is, both narrative verisimilitude and spatial immersion have underpinned a host of narrative effects and techniques relating to characterisation, dramaturgical staging, the orchestration of narrative perspectives, and the modulation of depth and flatness as markers of ontological states, all of which I will go on to detail in later chapters.

I will initially undertake a comparative analysis of the distinctions between 2D and 3D cinema based on a correlation between production mode and perceptual physiologies. Digital technologies’ contribution to 3D cinema’s transformation will

also be considered. With reference to German film theorist Siegfried Kracauer's classic remark that "the nature of film is the redemption of physical reality" (*Nature of Film*), I will argue for digital 3D's capacity to orchestrate a kind of "perceptual (hyper)reality", based on its (actual or virtual) two-camera mechanism of visual construction. I will further illustrate the grounds of aesthetic differentiation between 3D and 2D visuality by comparing representative 3D films and their 2D counterparts in detail. First of all, the "artificial authenticity" in terms of volumetric dimensionality and visuality will be exemplified by *Life of Pi* (Ang Lee, 2012) in comparison with its 2D counterpart *The Perfect Storm* (Wolfgang Petersen, 2000). Secondly, the extreme slow motion utilised in the brutal violent scenes in *Dredd 3D* (Pete Travis, 2012) and its 2D counterpart *Killing Them Softly* (Andrew Dominik, 2012) will be compared in terms of the level of visceral immersion. Lastly, the kinetic flight sequences in the 3D film *Star Trek: Into Darkness* (J.J. Abrams, 2013) and 2D film *The Dark Knight Rises* (Christopher Nolan, 2012), will be analysed in parallel to emphasise the perceptual amalgamation of physical mobility and spatial directionality. In each case, the Aesthetics of Recession (which favour depth planes extending back within the image as opposed to objects projecting forwards out of it) provide physical and narrative space in which the drama can unfold.

As a basis for the ontological comparisons between 3D and 2D cinema, I will begin by probing the principles of binocular vision on the basis of which stereoscopic 3D cinema is designed with its unique parallel-camera production mode, which differs from 2D cinema's single-camera monocular perceptual apparatus. Because of its parallel-camera production model being analogous to human beings' binocular vision, I will argue that 3D cinema better substantiates Siegfried Kracauer's remark about classical film ontology, namely that cinema is "the redemption of physical reality". This is particularly true of contemporary 3D films, in which the "aesthetics of recession" takes precedence over more disruptive and intrusive dimensional effects. Here, the "reality effect" conforms not only to narrative codes but also duplicates a key aspect of human vision, namely its binocular nature. Accordingly, my comparative analysis of the abovementioned films will emphasise 3D's capacity for replicating phenomenological qualities of depth and dimensionality, and thus for producing a sense of hyper-realistic vividness and intensity.

## **Binocular Vision and Stereoscopic Cinema**

Before considering Kracauer's claim in depth, I would like to examine stereoscopic perception from a physiological point of view. The stereoscope, which provides the technical underpinnings for 3D Cinema, is a visual technological mechanism based on *stereopsis*, caused by the human physiognomy of binocular disparity which permits depth perception. As Bruce Goldstein states, "The creation of depth perception based on binocular disparity involves two stages. First, **binocular disparity**, the difference in the images on the two eyes, is determined, and then this difference is transformed into the perception of depth. This perception of depth that results from the information provided by binocular disparity is called stereopsis" (233-234). In optometric terms, stereopsis is defined as "the binocular perception of depth upon retinal disparity. This results from the brain being presented with two slightly dissimilar retinal images. For stereopsis to be manifest, the images must be imaged on non-corresponding retinal points" (Evans 244). Despite the unfamiliar optometric discourse, several points here are instrumental to my argument. First of all, stereopsis is elicited by two slightly different retinal images because our eyes are horizontally separated; secondly, this binocular disparity causes the impression of depth arising in the pathway from the eyes to the brain; thirdly, stereopsis is achieved through the convergence of the two images into a single vision by sensory fusional mechanisms. Biophysicist Jerry Nelson points out: "There are many cues to depth, but stereoscopic depth is phenomenologically special and can be elicited almost exclusively by the cue of retinal disparity. Retinal disparities are small positional displacements between otherwise well-matched visual images" (218). Like the physiological sight apparatus, a stereoscopic image produces the "illusion of depth" by capturing two slightly different images and then aligning them based on the principle of human binocular vision.

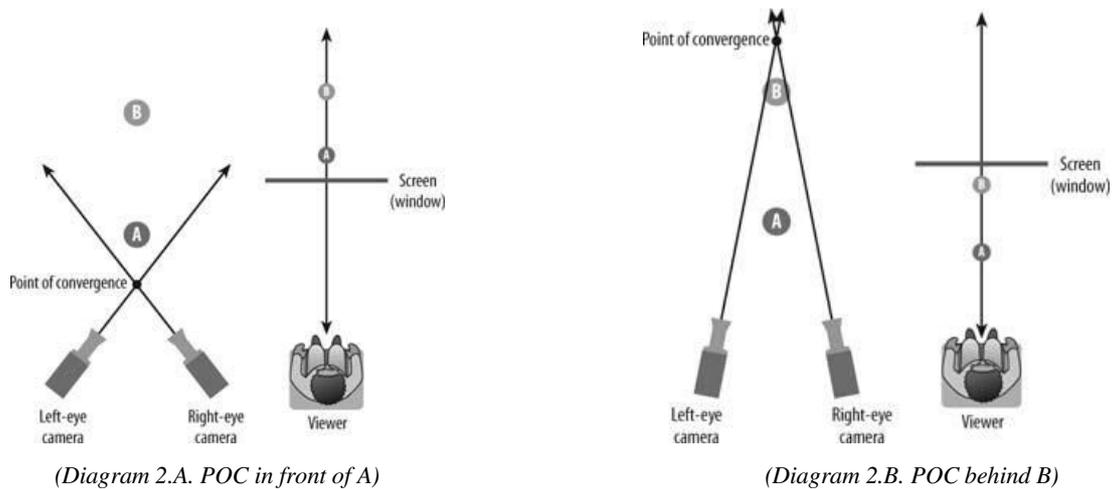
In reality, besides binocular depth cues there are many other depth cues, such as monocular pictorial cues, which also contribute to our perception of depth by providing overlapping information and working together with binocular depth cues (Goldstein 243-244). However, monocular pictorial cues, such as linear perspective, atmospheric perspective, relative size, and occlusion, "do not produce the same vivid phenomenological experience as does retinal disparity, probably because the neural

substrate for stereopsis is different from the substrate for these cognitive cues” (Nelson 219). Therefore, stereopsis “does increase the vividness of depth—near objects are seen more vividly in front of far ones when seen with two eyes than with one” (Haber & Hershenson 315). 3D stereoscopic cinema simulates the process of human stereopsis, producing “parallax shifts” which mark the distinction between near and far objects. As Herbert Zettl explains, these effects depend on “two additional binocular depth cues” (150-51): **convergence** and **accommodation**. Convergence in turn is decided by two technical paradigms: **Interocular Distance** (IoD) and **Point of Convergence** (POC).

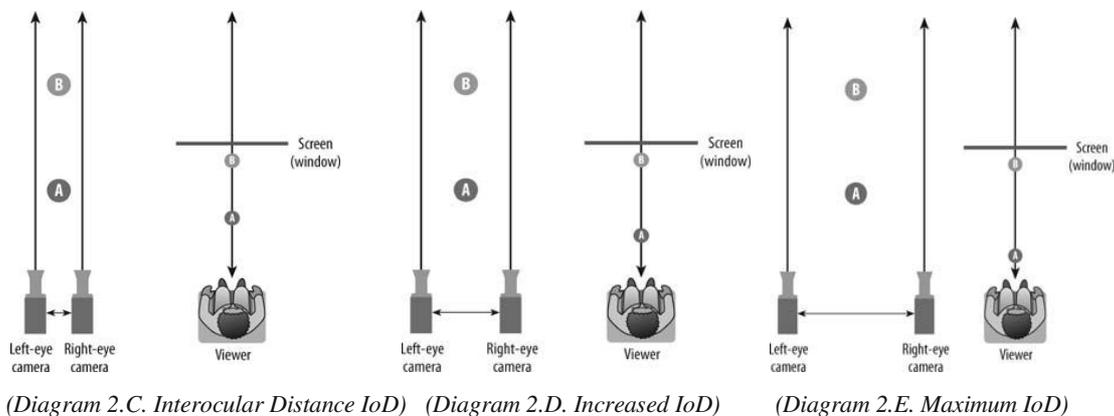
Interocular Distance (IoD), also referred to as Interaxial Distance,<sup>6</sup> refers to the distance between two cameras positioned in parallel to one another (or the distance between the centre point of two camera lenses), whose placement roughly resembles the two eyes of human beings about 2.5 inches apart. When manipulated to increase the IoD, the illusion of depth will be accentuated, and vice versa. Point of Convergence (POC) signifies the point at which two dislocated images caught by the two cameras align to fuse into a single vision, which in optometry is referred to as a single vision achieved through sensory fusion (Nelson 219). On the 3D film set, the POC can be changed so that people or objects appear either “behind” a 3D screen (also called a “window”), which is called **positive parallax**, on the window (**zero parallax**), or in front of the window (**negative parallax**) (Zettl 151). The exact POC will be determined by the two side-by-side cameras’ inward angle, or the angle at which they pivot toward one another, and the adjusted IoD. By turning the two cameras inward and locating the POC in front of the filmed people and objects, the images captured by the cameras will be confined to the positive parallax behind the 3D screen (diagram 2.A); on the other hand, by straightening the inward angle of the two cameras and situating the POC behind the main events, they will appear to take place in the negative parallax, that is, in front of the 3D screen (diagram 2.B).

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<sup>6</sup> Stereographers often use “interocular” to refer more specifically to the distance between human eyes and “interaxial” to refer to the distance between the centre points of camera lenses.



If the two cameras are fully straightened to make them completely parallel with each other, then the people and objects captured will all be in the negative parallax, which generates the signature 3D “protrusion effect” by making actions or objects appear to move along the Z-axis towards the audience. This “protrusion effect” can be further accentuated by pulling apart the two parallel cameras and subsequently increasing the IoD, and vice versa (Diagram 2.C, 2.D, & 2.E<sup>7</sup>).



Although the “protrusion effect” is not now as shocking as in its early days, when 3D excited audiences in the early 1950s, the protrusion technique is still the most distinctive and exclusive 3D visual effect and is often capable of scaring the audience out of their seats in theatres. For example, when an arrow or an ax is thrown quickly towards the audience from the depths of the image, viewers will arguably react physiologically to this abrupt threat much more overwhelmingly than when seeing it in 2D. This is because the monocular cognitive cues do not produce the same

<sup>7</sup> All diagrams (A-E) are cited from *Why 3D May Work Occasionally: Case Reopened* written by Herbert Zettl, published in *Visual Communication Quarterly* 19.3 (2012): pp.152-153.

vivid phenomenological experience as does retinal disparity, due to the difference between the neural substrate for stereopsis and monocular perception (Nelson 219). If 3D films are able to produce such heightened effects, it is precisely because stereoscopic cinema's technology of image capture mimics aspects of human binocular vision.

Accommodation, another binocular depth cue, refers to the lens of the eyes constantly changing focus so that we can clearly see objects at different distances, near and far (Goldstein 42). "The eye's lens is relatively thin when fixating on a faraway object, but it gets thicker when focusing on the closer object" (Zettl 151). According to Goldstein, accommodation cue is effective only at distances of less than 2 metres (Goldstein 244). This indirectly explains why the effectiveness of the stereoscopic illusion is more reinforced in the negative parallax space, which is the closer visual field from the audience. "In concert with convergence, accommodation aids the brain in estimating distance" (Zettl 151). On the other hand, Zettl points out, "this autofocus mechanism of our eyes can also cause trouble when watching 3D images on screen" (151), if certain techniques popular from conventional 2D filmmaking such as shallow focus or rapid change of depth-of-field, or 3D-exclusive devices like rapid change of POC are over-employed (156). Nevertheless, in the following sections, I will argue that by exploiting the advantages of the stereoscopic technique and sometimes intentionally making use of its pitfalls, 3D cinema may substantiate Kracauer's statement that the nature of cinema is "the redemption of physical reality" in a more precise phenomenological way than traditional 2D cinema does. In other words, 3D cinema conjures physical reality through a direct address to our physical capacities. In concert with specific narrative techniques, it can evoke our perceptual access to "lifelike" three-dimensional experiences.

The multiple manifestations of contemporary 3D imagery (whether via camera capture, 2D-3D conversion, CGI rendering or VFX) are often tightly integrated with digital processes and effects. This marks out the current wave of 3D cinema as a predominantly digital phenomenon. However, the ontological essence of stereoscopic images (which simulate human binocular vision by using an actual or virtual two-camera mechanism) has not changed, since the stereoscope was invented by Professor Charles Wheatstone over 150 years ago. Accordingly, the "reality effect" of digital 3D cinema bears much in common with earlier examples of the form.

## **Reconstruction of Physical Reality**

In *Theory of Film: The Redemption of Physical Reality* (1961), Kracauer contends that realism is the core value for cinema based on his premise that cinema is photographic in nature: “All this means that films cling to the surface of things. They seem to be the more cinematic, the less they focus directly on inward life, ideology, and spiritual concerns” (X). Rereading his texts amidst the current process of digital transformation, we know the photographic nature of cinema is barely changed in certain key respects, because digital devices, whether capturing images in 2D or 3D, are still based on the photographic perspectival principle and mechanism (I am, here, setting aside debates about the questions of digital images’ indexicality, or lack thereof [Rodowick, *The Virtual Life*]). The only difference between a 2D camera and a 3D camera is that the former simulates monocular perception and the latter resembles binocular vision. Even though monocular cues aid in depth perception, as discussed earlier, binocular depth cues bring up a much more vividly phenomenological experience of depth, thereby enhancing our sense of depth and spatiality through the stereo illusions that match the “neural substrate” engaged in our optical processing of reality.

Despite his focus on black and white films, Kracauer associated “physical reality” with “life” by stating: “...the only reality we are concerned with is actually existing physical reality—the transitory world we live in” (28). In similar way, André Bazin articulated the notion of a “total cinema”, the foundations of which can be traced back to the imaginations of a few cinematic precursors in the nineteenth century: “In their imaginations they saw the cinema as a total and complete representation of reality; they saw in a trice the reconstruction of a perfect illusion of the outside world in sound, color and relief” (Vol. 1: 20). In his embrace of various cinematic innovations, Bazin was more sensitive than Kracauer to the essential influences brought to the mechanical reproduction of reality by a variety of technical developments. Accordingly, he seems to imply that the reconstruction of reality could take place via the stereoscopic illusion:

As for the latter [relief], the film historian P. Potoniée has even felt justified in maintaining that it was not the discovery of photography but of stereoscopy, which came onto the market just slightly before the first attempts at animated

photography in 1851, that opened the eyes of the researchers. Seeing people immobile in space, the photographers realized that what they needed was movement if their photographs were to become a picture of life and a faithful copy of nature. (Bazin, 1: 20)

Although what Bazin emphasised here was movement that brought alive the photographs and made them credible reproductions of the real world, by stressing movement and referring to stereoscopy, he was one of the earliest film theorists to legitimate the contribution of spatial depth to cinematic photorealism. Bazin equated stereoscopy's contribution to realism with those of sound and colour: "That is why it would be absurd to resist every new technical development aiming to add the realism of cinema, namely sound, color, and stereoscopy" (Vol. 2: 26). Indeed, Bazin's commitment to deep focus and long-take aesthetics is mirrored in the favouring of spatial integrity, as against the discontinuity of montage, in key contemporary 3D works. Thus it is neither coincidental nor surprising that a number of the most notable contemporary digital 3D films favour long-take aesthetics<sup>8</sup> and deep-focus.

However, despite Bazin's engagement with cinematic realism and cinematic form, it is Kracauer's direct engagement with physical reality that seems most productive with regard to my own argument. Admittedly, Kracauer's theory was targeted at black and white films and he deliberately ignored colour films, even though by the time his book was published, colour had noticeably become the new standard for most types of theatrical release movie-making worldwide. In addition, his theory seems not to apply directly to synthetic or animated images, whether digital or analogue. Nonetheless, 3D's reality effect and, perhaps more importantly, its close alignment with aspects of embodied vision, make Kracauer's ideas highly relevant in this context.

The two modes of 3D realism outlined earlier, verisimilitude and immersion, both tend to reveal the qualities (and perhaps also the limitations) of 3D cinematic ontology. As Bazin put it, "realism in art can only be achieved in one way—through artifice" (Vol. 2: 26), which is not only applicable to particular filmic forms of realism but also appropriate to define a hyper-realistic sense of credibility and experience engendered by cinematic verisimilitude and immersion. Bazin's above

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<sup>8</sup> Examples include *Avatar* (James Cameron, 2009) and *Gravity* (Alfonso Cuarón, 2013).

assertion about “realism” could thus be seen to overlap with Stephen Prince’s claim that 3D cinema is a “visual effect” (*Digital Visual Effects* 218) – a kind of high-end artifice. Both verisimilitude and immersion can be understood as kinds of “reality effect” based on “perceptual reality” and achieved by visual techniques. Even though this “heightening of vision” (219) primarily produces “artificial authenticity”, it still leads us to return and reevaluate Kracauer’s well-known remark about the nature of cinema, namely its “*redemption of physical reality*”.

We may understand that *redemption* tends to mean *recovery* or more loosely the *establishment* of life-like reality through filmic means. Thus, if we accept that Kracauer’s assumption of cinema’s photographic nature still finds a foothold in the digital age while his claim that “films cling to the surface of things” speaks a certain truth, then we can update his notion of recovery by claiming that digital three-dimensional imagery recovers or even recreates “physical reality” by “clinging not to the surface but to the *volume* of things” (X). Since the physical reality around us is a three-dimensional world perceived by our eyes, stereoscopic 3D, which simulates the mechanism of our binocular vision with two-camera capturing configuration, can emphasise spatial depth more vividly, thereby recreating three-dimensional physical reality with a greater resemblance to stereo illusions. Furthermore, even though generally regarded as an inferior cinematic tool used merely to engender spectacle, from Kracauer’s perspective 3D becomes “more cinematic” because of its potency to recover the three-dimensional “volumes of things” with “less focus directly on inward life, ideology, and spiritual concerns”. In fact, through its amalgamation with digital technology, 3D has not just contributed to recovering what Kracauer termed “physical reality” but has gone a step further to (re)create or (re)construct “physical reality”:

The motion picture camera has a way of disintegrating familiar objects and bringing to the fore—often just in moving about – previously invisible interrelationships between parts of them. These newly arising complexes lurk behind the things known and cut across their easily identifiable contexts...In rendering physical existence, film tends to reveal configurations of semi-abstract phenomena. Sometimes these textures take on an ornamental character. (54)

I would like to divide Kracauer's above remark into two parts, separated by the ellipsis. It is without doubt that the film camera, "often just in moving about", is much better able to show us visual objects in more detail and with more concrete spatial relationships than still photography. The mobility of camera and objects disintegrates things but also contributes to the revelation of the "previously invisible interrelationships" of the objects or parts of them. Sometimes, the complexes caused by disintegration make the familiar objects appear dissimilar, even severed from easily recognizable contexts. In the case of 2D and 3D cinema, it is reasonable to suggest that 3D's two-camera device has a much stronger power "of disintegrating familiar objects and bringing to the fore previously invisible interrelationships between parts of them" (Kracauer 54) than 2D's one-camera mechanism. Because 3D's two-camera-mechanism can produce a stereoscopic illusion with dual volumes which is more like the human optical processing of physical reality, it thereby literally disintegrates objects into slightly dissimilar images, sometimes so dissimilar that the objects are brought into the negative parallax in front of the 3D screen. This peculiar visuality incited by binocular disparity happens exclusively in the 3D viewing experience.

Just as in optics, however, human beings' binocular disparity cue is not always "on duty", because monocular cues also help us perceive things and make judgments of spatial distance and depth. Only when our eyes receive particular stimulations that require a strong sense of comparative depths of different objects will the binocular disparity cue be triggered to function. Therefore, in 3D the audience may perceive events, not only those happening in the negative parallax space, in a more tangible way and discern the spatial depth and volumetric abundance more intensely. In contrast, 2D's one-camera-mechanism based on the principle of monocular vision can never engender the binocular-disparity visuality that 3D does in terms of (re)constructing the physical reality. This is easily but very convincingly evidenced by a comparison between the 3D and 2D versions of the exhibitor's logo shown before the beginning of every feature presentation in an Event Cinema theatre.

The 2D logo starts with series of rectangle-shaped red bars coming forward quickly from the background, followed by a few obscurely shaped red bars scattering apart; then the scattered pieces move toward the foreground with velocity. Gradually

the viewer can recognise the shapes of these bars as rectangles with strong perspectival designs. Finally the very front pieces of bars take a U-turn back and gather with later-coming ones to form the logo word, EVENT. The five letters stand for a few seconds before fading out at an oblique angle, with the letter T relatively bigger than E because it is the closest to the audience and V the biggest due to the design.

In the 3D version, this series of movements and relationships is strategically arranged across both spatial volumes and connected seamlessly in order to reinforce the augmented mobile and in-depth visuals for the audience. The initial action of the red bars coming forward actually starts in the positive parallax, and then crosses the 3D window to enter the negative parallax and fly into the audience's face. This is a typical 3D signature shot with "protrusion effect" that accentuates stereoscopic spatial depth. Shortly after, another scattering of red-bars takes place in the positive parallax behind the 3D screen to emphasise the bars' momentum of breaking up and the irregular movements of the fragmented pieces; then the broken pieces of bars in manifest rectangles advance rapidly across the 3D window and emerge in the negative parallax between the screen and the audience. The foremost pieces of bars, however, reduce their velocity when arriving half way in the negative parallax and then recede slightly, instead of protruding straight ahead into the eyes of the audience. These receding bars conjoin with more crossover red bars and together they configure the word EVENT right in the middle of the space between the 3D window and the audience; meanwhile, the still advancing red bars cease to cross the window.

In so doing, the logo is arrested with a very accentuated and pronounced stereoscopic look, swaying slightly in a location not too close to the audience. Here, the amplified three-dimensional demonstration of the cinema logo is compelling enough to showcase the trademark; on the other hand, it gives the audience a more concrete dimensionality and sense of spatiality of the visual entity. The feeling is like in reality when we see a swaying banner with interesting words in front of a huge window or stage curtain; we naturally expect to see something happen behind the window or the curtain. This two-stage cross-parallax movement and graphical display in 3D version is carefully designed to induce a sense of physical reality in the stereoscopic pattern. This process is precisely what Kracauer described as

“disintegrating familiar objects and bringing them to the fore” (54), represented by red bars fragmenting into pieces and flying forward from behind the 3D screen. Then the process continues with disclosing “the previously invisible interrelationships between parts of them” when the moving red bars gradually unveil their rectangular shape and then crystallise into the stereo cinema logo transparently close to the audience. The visual tactic occurs in accordance with physiological habits that determine distance: “Johnston et al. (1994) studied stereo and motion cues, and found that stereo cues were more heavily weighted at near distances, but motion cues were more heavily weighted at far distances” (Mather 288-9). In this instance of 3D graphic manipulation, the disintegration and movement in the positive parallax, the fragmented bars moving across the 3D window, and the transformation and settlement of the cinema logo in the negative parallax are deployed in a continuously stereoscopic visual entity. Not only does it serve as an allegory of Kracauer’s affirmation that the nature of cinema is the redemption of physical reality, but it also recreates and reconstructs physical reality in a more virtualised sense. That is to say, the “reality” being redeemed is not, in this case, a literal rendering of the outside world (after all, the letters themselves exist entirely in virtual space); rather, the “reality effect” of 3D depends heavily on the “physical reality” of human binocular perception.

By contrast, the 2D version of this EVENT logo presentation appears plain and opaque in terms of space and texture, although the image content of both presentations is exactly the same. Moreover, since there are no dual-parallax depth references along the Z-axis in the 2D screen, the bars advancing from the background to the camera are not as stunning as they are in the 3D version. For the same reason, the final “three-dimensional” EVENT logo forged by monocular design cues is not as eye-catching as in the 3D version, even though it approximates depth using shadows and relative sizes for the slanting letter layout. In summary, compared with this 2D design of a three-dimensional presentation, the stereoscopic 3D version is much more volumetrically acute and transparent in terms of both dimensionality and directionality. As Ang Lee remarks: “I think we should discover what 3D is. It’s just different from 2D...3D picks up so much. It’s about volume. It’s not about action. Really.” (“Exclusive Live Video Interview”) This is why Miriam Ross suggests employing “hyperhaptic” to describe 3D visuality: “there is a distinct visual regime

produced by stereoscopic moving images. Stereoscopic film's abundance of depth planes (even considering the camera's limitations), and the way in which it often incites other sensory perceptions, bring into play its hyperhaptic mode" ("The 3-D Aesthetic" 397). This "hyperhaptic" mode brings stereoscopic hyperrealism to a whole new level that has not been evidenced in other media formats.

### **A Transparent Oval Sphere with Imbalanced Volumetric Duality vs. A Flat Painting Canvas**

To set a metaphorical framework for my argument, 2D and 3D filmmaking can be distinguished by a comparison between a flat painting canvas on the one hand and a transparent oval sphere on the other hand with a window inserted between the positive volume (positive parallax space) and negative volume (negative parallax space). The inserted window, nonetheless, does not equally divide the dual volumes in this oval sphere but rather grants infinite depth to the positive volume behind the window while retaining limited swell for the negative volume in front of the window. Because this oval sphere is crystalline and transparent, the imbalanced 3D window position suggests boundless spatial scalability and plasticity in the positive volume while investing the shallow negative volume with more fragility, vulnerability and intensity. Compared with 2D's planar canvas, not only is the space along the depth of the Z-axis unlimited, but the space along both the horizontal X-axis and vertical Y-axis is sometimes also expanded and heightened. Therefore, 3D's volumetric duality provides endless potential for filmmakers to explore spatial elasticity and expandability. With reference to Kracauer's claim that "films cling to the surface of things", for 3D, as I suggested earlier, this claim should be modestly revised to state that "stereoscopic cinemas cling to the *volumes* of things" because "3-D is the only format to suggest the impossibility of a stable surface for the moving images" (M. Ross, 384). Moreover, if the nature of 2D cinema is the "redemption of physical reality", then Kracauer's phrase would more precisely fit the nature of 3D by slightly changing it to the "*recreation or reconstruction* of physical reality". I will substantiate this claim by comparing Ang Lee's recent 3D success, *Life of Pi* (2012), a film about an Indian boy and a Bengal tiger struggling to survive with each other on the boundless ocean, with Wolfgang Peterson's 2D counterpart, *The Perfect Storm* (2000), which is based on a real-life story of five Bostonian fishermen killed by an extraordinary storm in 1990.

I would like to use the climactic storm scenes in both *Life of Pi* and *The Perfect Storm* for a parallel analysis of the spatiality configured in a planar 2D “canvas” vs. the oval 3D oval sphere with its dual volumetric “plasticity”. Clearly, these are very different films, made in different contexts, so there are limits to the comparison – although I argue that the formal differences are quite instructive, demonstrating how directors have tackled similar scenes in 2D and 3D and highlighting the contrasts. Both scenes successfully manifest the ferocity and strength of nature by employing digital special effects to recreate the storms with live action sequences (both were shot in a water tank) but with different emphases of 2D and 3D functionalities in spatial fabrication. The two films’ main stories both take place on a boat floating on the sea and both climactic scenes show a cruel confrontation between the main characters and a powerful natural storm. In *The Perfect Storm*, the fishing-boat is named *Andrea-Gail* with five fishermen onboard; in *Life of Pi*, it is a lifeboat on which an Indian boy Pi and a Bengal Tiger named Richard Parker survive the sinking of a passenger ship. As a typical Hollywood disaster-genre blockbuster, *The Perfect Storm* follows the traditional rules of balanced integration of narrative and spectacle in order to tell a believable story based on a true event. *Life of Pi* does the same in this sense. However, since *Life of Pi* is more of a character-driven drama and director Ang Lee attempts to express some profoundly metaphysical messages related to belief and spirit through this simple survival story, he portrays the storm in this climactic scene as an alive and influential character that delivers spiritual revelations to the protagonist Pi. Moreover, Lee illustrates Pi’s and the tiger’s dramatic responses to the revealing storm in order to make the audience sympathise and identify with Pi and thereby be further open to thinking about the allegorical issues expressed through the story. Thus, a fundamental difference exists between the two films’ portrayal of both the storm and the main characters with different notions and strategies that accentuate the differing spatial configurations in 2D and 3D filmmaking.

In *The Perfect Storm*, the characterisation of the storm is only sketchy and panoramic, portrayed primarily to demonstrate the storm’s destructive power and to characterise it as “a mobile agent that devastates the environment of the human figures” (Wood, *Digital Encounters* 61). As Wood argues:

Once the *Andrea-Gail* has sunk, the power of the sea and of nature as an elemental force is triumphant, whilst the human figure of Bobby (one of the *Andrea-Gail*'s crew) is small, insignificant and finally lost as he recedes into the distance of the shot. Through these scenes the multiple elements of *The Perfect Storm* come together into a single timespace. (61)

Inside this timespace, despite close-ups and medium shots to display crews battling the water in the sword-boat, it is in fact the mostly digitally-generated wide and long shots of nature's power, in which human and boat figures are dwarfed as tiny dots on the swell of the massive waves, which evoke awe and intensity in the audience. Although the waves are at a distance and without much detail, the audience is still awed by the momentum and huge size of the water swell because of the contrast between the human-sized figures (boat and fishermen) and the natural environment. By emphasising this compositional contrast of object sizes, the magnificence of the natural forces is stressed in this striking and convincing spectacle.

By contrast, there are few extreme long shots synthesized with digital special effects in the climactic "storm revelation" scene of *Life of Pi*, although one appears at the very beginning of the scene before the storm comes and others are inserted into the middle of the scene. In 3D, extreme long shots often make the main objects become disproportionately small, thus regarding as one of 3D's disadvantages. Nonetheless, by exhibiting the disproportionately tiny figure of Pi and the tiger on the lifeboat floating on the colossal ocean in an extreme long shot, Lee increases the immense contrast between the two finite, living, creatures (Pi and the tiger) and infinite nature (the endless water). In the deep-focus extreme long shot that introduces the impending storm, the contrast is not only enhanced through compositional size, like in *The Perfect Storm*, but also reinforced through the particular "shrink effect" for long shots that characterises stereoscopic imagery. This is an eminent instance of Lee innovatively turning a 3D disadvantage into a creative advantage. Furthermore, along with the above "shrink effect", by arranging Pi and the tiger on the lifeboat far back in the positive parallax with deep focus, Lee exploits the dual volumetric spatiality in stereoscopic cinema and intentionally enlarges the spatial distance between the objects and the audience, thereby underlining the insubstantiality of the surviving figures compared with the surrounding endless sea. Similarly, the inserted extreme

long shots are intercut with closer shots of Pi and the tiger, overtly underscoring the powerlessness of the struggling and terrified pair during the confrontation with Nature's brute force – the storm, which is characterized by Lee as the messenger or the delivery vehicle to carry out God's will or guidance for Pi.

In the entire “storm revelation” scene, Lee relegates Pi to both physical and mental torture from the storm and then anguished, desperate questioning of this brutal messenger, before Pi finally discovers that it “is so beautiful” and drags the frightened tiger out of the tent to bear witness to the message with him. Through the above actions, Pi attempts to communicate with God in this extremely catastrophic circumstance and eventually realises his catharsis by fearlessly contemplating the messenger (the storm) with his tiger companion. Later, Lee separates the exhausted pair at each end of the lifeboat, meditating, before Pi moves to the tiger, hugging him and trying to comprehend the meaning delivered by this brutal catastrophe. Most shots in this scene are close-ups and medium close-ups to show Pi's and Richard Parker's facial or flailing reactions to the storm, especially when shots of Pi peeking out from underneath the canvas are cross-cut with the frightened and confused expressions on the tiger's face.



**Figure 2.1** *Life of Pi* (Ang Lee 2012). Dual volumetric spatiality intentionally enlarges the spatial distance between the objects and the audience in order to underline the insubstantiality of the surviving figures compared with the surrounding endless sea.

It is worth noting that Pi's close-ups are deployed slightly in the negative parallax in front of the 3D window as Pi madly shouts at the storm. In so doing, Lee highlights Pi's own psychological dread of and desperation with the storm. Moreover,

by deploying stereoscopic cinema's "intrusion effect" on the viewer in the negative parallax, he cunningly transmits Pi's immense physical pain and psychological frenzy to the audience, confronting them with an immediate and overwhelming impression of his emotional state.

For the later segment inside the lifeboat, Lee adopts close-ups and medium close-ups to single out each character before a final two-shot shows the two huddling together in one frame. Every close-up or medium close-up for either Pi or Richard Parker shows their exhausted and tortured expressions, amalgamated with 3D's volumetric spatiality to emphasise the claustrophobic feeling inside the narrow lifeboat covered by the canvas. Unlike the strategy for previous close-ups of Pi outside the lifeboat, here both he and the tiger are placed in the positive parallax behind the 3D window; however, the spatially enhanced volumetric emptiness between the character and the audience palpably increases the psychological claustrophobia for the audience. Indeed, here close-up does not bring the usual sense of intimacy as it does in 2D media. Drawing on Joshua Meyrowitz and Paul Messaris's Para-proxemics theories, Zettl states: "Even the same close-up may have a completely opposite psychological effect when shown in 3D instead of 2D" (157). The above example demonstrates how Ang Lee uses 3D tactics deliberately work counter to our perceptual habits, thereby manipulating the intrinsic traits of stereoscopic cinema with both its advantages and disadvantages.

These 3D traits such as volumetric duality, imbalanced spatiality in the positive parallax and the negative parallax, elasticity of the positive parallax and fragility of the negative parallax, and so on, inspire creative filmmakers to recreate "physical reality" and construct cinematic spectacles in innovative ways. When interviewed during the 2103 *3D Creative Summit* in London, Lee remarked: "For over a hundred years, we (our eyes) have compensated for the lack of volume in 2D, so we actually see 3D in 2D media...I think when you pick up something that actually has volume, the whole rules of the game should be gradually changed...we're in the transitional time to the new illusion of cinema" ("Exclusive Live Video Interview"). His remark reveals the fundamental difference of creative rules between 2D and 3D cinema when dealing with a "flat canvas" and with a transparent "oval sphere" with imbalanced dual spatial volumes.



**Figure 2.2** *Life of Pi* (Ang Lee 2012). Pi's close-up is deployed slightly in the negative parallax in front of the 3D window as Pi madly shouts at the storm; so that the audience may feel Pi's immense physical pain and psychological frenzy through the trans-sensory identification with the character.

### **Viscerality and Palpability: Stereoscopy and Slow-Motion Violence**

In this section, I will compare two killing scenes in *Dredd 3D* (2012) and its 2D counterpart *Killing Them Softly* (2012) in order to argue that 3D, in combination with extreme slow-motion technique, offers greater perceptual authenticity to enhance the violence of bloodshed. Again, there are many variables that limit the value of a dual analysis of the films; however, the parallels are illuminating and provide the grounds for a useful comparison. In both films, the two filmmakers adopt a similar technique—extreme slow-motion—to stress bloody and violent killing scenes; however, I would argue that integration with 3D in *Dredd 3D* makes the brutal effect more graphically striking, more psychologically unbearable and more metaphysically realistic in terms of the dimensional and directional authenticity of blood flow and bullet trajectory. In *Dredd 3D* (2012), Judge Dredd and rookie judge Anderson, who is on her first training day, go for a mission together and storm into a drug dealer's apartment in Peach Tree Tower, where they kill the two drug users who try to grab their guns in resistance. In *Killing Them Softly* (2012), mob hit-man Jackie Cogan sits in his car and kills his target Markie, who has mishandled a gambling racket, and is sitting in another car stopped at an intersection in the rain.

The aesthetics of slow-motion violence have existed ever since the late 1960s New Hollywood Movement, with Arthur Penn's ground-breaking climactic ambush scene of the two infamous outlaws in *Bonnie and Clyde* (1968) and Sam Peckinpah's exemplary slow-motion violent film, *The Wild Bunch* (1969). When comparing these two films, Stephen Prince contends,

...slow-motion images derive their poetic force from the metaphysical paradox of the body's continued animate reactions during a moment of diminished or extinguished consciousness. Slow motion intensifies this paradox by prolonging it. It is not just the moment of violent death which is extended, but the mysteries inherent in that twilight zone between consciousness and autonomic impulse, that awful moment when a personality ceases to inhabit a body that is still in motion. (*Screening Violence* 185-6)

During the 1990s, Hong Kong filmmaker John Woo borrowed this aesthetic of slow-motion violence from Hollywood and developed it by incorporating dissolve-in-succession editing into the brutal shootout scenes in his gangster movies to give them a more poetic and beautiful look. Since the start of the new century, slow-motion aesthetics have been utilised ubiquitously in both Hollywood blockbusters and other commercial movies made around the world which involve gore, bloodshed, and explosives. Most filmmakers adopting these aesthetics still retain the extremely fast camera speed and the dissolve-in-succession editing strategy in order, as Prince comments on Peckinpah's films, to "emphasize the brutality of physical violence while also giving it a graceful beauty" (*Screening Violence* 184). Prince acclaims Peckinpah as "the exponent of slow-motion violence"; as he further points out: "The contradiction between the aesthetic beauty of the visual spectacle and the emotional and physical pain that Peckinpah also dramatized as part of his screen violence is a complex and important one..." (184). In my two comparative cases here both filmmakers use the techniques of extreme slow-motion and dissolve-in-succession montage; however, they have different soundtrack design tactics to emphasise the "beautifully violent effect". More importantly, they employ the same slow-motion violence aesthetics with two different kinds of media. I would argue that because of stereoscopic 3D cinema's capacity for representing directionality and dimensionality, its integration with classic cinematic techniques such as extreme slow motion, special

effects and enhanced sound design has greater visceral and tactile ability to accentuate graphic violence than conventional 2D media.

In *Dredd 3D*, the story is set in a futuristic dystopian mega-city in America which has been overtaken by organised crime, so that the law enforcers, a squad of arm judges, must react to criminals mercilessly at every crime scene to serve justice. Extreme slow motion technique is employed in all gun fighting scenes throughout the film. In the scene under discussion where Judge Dredd and Rookie Anderson storm into an apartment and both point their machine guns at two teenage drug users, they shoot and finally kill them as the latter fumble to pull out their handguns. This series of actions is mostly deployed in the positive parallax in order to display the intensity of the shooting with a lot of gun fire and bullets filling the screen. Intriguingly, however, the filmmaker does not use a single three-dimensional shot that lets the bullets fly into the audience along the Z-axis; instead, all of the bullets fly horizontally across the positive parallax space behind the 3D window.

To emphasise the brutality of killing, a few close-ups, which are intercut with normal-speed shots of the two officers firing their guns, show the belly of one young drug user being shot. With the extreme slow motion effect we can perceive the process of the bullet burrowing into his skin, the blood spurting out and his skin breaking up while the bullet moves through his body. Because the stereo effect underscores spatial depth and material plasticity, even though these actions are all displayed in the positive parallax, they function as sensationally visceral and psychologically unbearable when the bloody violence can be observed this closely and broken down nearly frame by frame. The trajectory of the bullet inside the human body and the splashing blood spots, as well as the motion and direction of the breaking skin, is so compellingly authentic that the audience feels the visceral pain and psychological cruelty in a sense which is shockingly “hyper-haptic” to use (M. Ross’s term). Moreover, in the last couple of shots, in which a few blood spots splatter forward and across the 3D window, flying into the negative parallax at an extremely slow velocity, the bloodshed and violence of this scene is climactically augmented by this restrained adoption of the “protrusion effect”, so that the brutal viscerality generated by 3D’s volumetric duality is reinforced. In short, the striking effects in *Dredd 3D* take place mainly in the positive parallax, with only a couple of

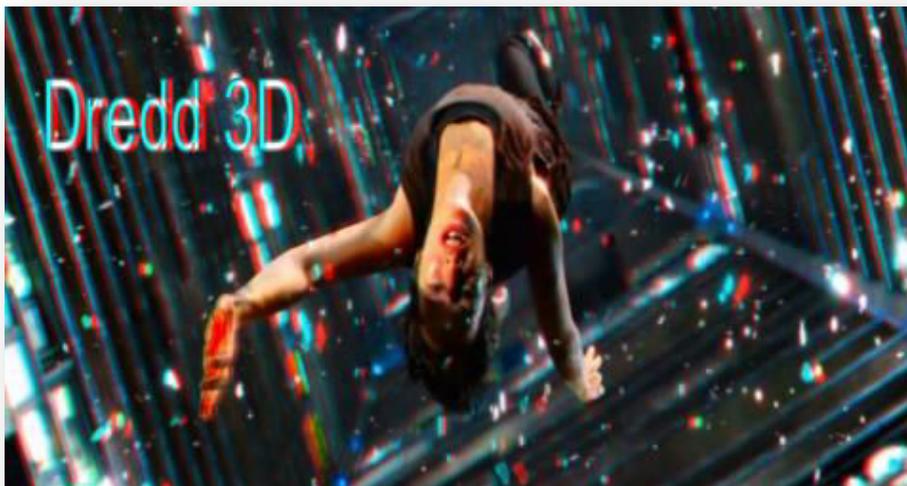
shots “protruding” into the negative parallax in order to enhance the dimensional elasticity and directional scalability in stereo space. Because the swell in front of the 3D window in the negative parallax is fragile and sensitive as an uncomfortable zone for the viewer, the economic application of the “protrusion effect” actually makes it more visually and sensually stunning.

It is also worth noting that in *Dredd 3D* there are several long shots interspersed periodically throughout the scene to show the volumetrically spatial locale – Peach Tree Tower apartment. The long shots not only display the two judges storming into the apartment and the two drug-users’ first reaction of fumbling for guns in their pockets, but they also exhibit the two resisting drug-users falling through the air very slowly after being shot. These extreme slow-motion long shots of drug-users falling take on a palpable effect in stereo mode as they resemble sculptural entities dropping in such a dynamically authentic direction that we can envision their soon-to-be-destroyed status but can do nothing to help. This effect occurs not only because, according to Prince, “slow motion is especially powerful when it correlates with a character’s loss of physical volition” (*Screening Violence* 185). It is also because the enhanced volumetric spatiality and the bodies’ falling directionality simply make “the awful moment” more sensible and palpable “when a personality ceases to inhabit a body that is still in motion” (185-6).



**Figure 2.3** *Dredd 3D* (Pete Travis, 2012). The trajectory of splashing blood spots and the bullet moving inside the human body, as well as the motion and direction of the breaking skin, is so compellingly authentic that the audience feels the visceral pain and psychological cruelty in a shockingly palpable sense.

In the counterpart scene of the 2D film *Killing Them Softly*, the enforcer Jackie Cogan (Brad Pitt), working for the mob, sits in a car and uses a handgun to kill his target Markie Trattman (Ray Liotta), who sits in another car stopped at an intersection. Aside from strategic soundtrack differences (soft pop music for *Killing Them Softly*; an oddly intensified and sustained high-pitch sound for *Dredd 3D*) and other variables (casts, shot scales, scenes and props), slow-motion and dissolve-in-succession, which are typical Violence Aesthetic techniques, are used here in a similar way to *Dredd 3D*. Instead of the super-slow display of the trajectory of a bullet moving inside the drug-user's body in *Dredd 3D*, the extreme slow-motion in *Killing Them Softly* is concentrated on showing the trajectory of bullets advancing through the air and the postures of empty shells "dancing". Different from the dimly reddish and overly-saturated neon lit apartment of the dystopian mega-city in *Dredd 3D*, the scene from *Killing Them Softly* takes place in a familiar contemporary setting. Our immersion in that setting is intensified by the annoying sound of wipers on Markie's car window and the splashing water-drops of the suffocating rain. Meanwhile, the basic dual-angle shot/reverse shot camerawork and editing principles are consistently executed in both cases. The extreme slow-motion shots for the killed and the killers are intercut with each other throughout both sequences, except that the last shot in the *Killing Them Softly* sequence provides a fresh perspective from outside the front window of Markie's car to confirm his demise and conclude the entire scene.



**Figure 2.4** (3D still) *Dredd 3D* (Pete Travis, 2012). By amalgamating with extreme slow-motion technique, the stereoscopic, nearly frame-by-frame breakdowns of the human body dropping or being torn in detail allow the audience to closely gaze at the graphical violence and palpably feel the tortured viscerality.

Notwithstanding that the camerawork and editing tactics adhere to the same philosophy, the shot scales for the two scenes are slightly different. In *Killing Them Softly*, close-ups and medium close-ups are dominant mainly because of the confined spaces for both the killer and the target, which both remain inside their cars throughout the scene. However in *Dredd 3D*, a few long shots are inserted from time to time in order to exhibit the volumetrically-abundant space of the apartment. Secondly, the imagery used in the two sequences is quite different, especially for the targets being killed. In *Killing Them Softly*, the shots of Markie manifest his body struggling to survive, trembling, shaking, and the agony expressed on his face when abruptly being shot in his own car at an intersection. These shots in slow-motion close-ups are edited together through dissolve-in-succession. Because there are only two shot/reverse shot angles offered and the shot scale is simply of close-ups, the scene overall gives the audience a sense of formal and stylish aesthetics rather than a psychologically and physically engaged feeling. In *Dredd 3D*, on the other hand, the slow-motion close-up imagery magnifies how a bullet drills into a human body and travels through it with an overt trajectory, how the broken skin shatters, and where the gore splatters and the bloody spots splash directionally with dimension, instead of the target's painful facial expression and tortured body language. These stereoscopic, nearly frame-by-frame breakdowns of the human body being torn in detail provide the audience with an opportunity to closely gaze at the graphically violent event as though through a microscope, which is impossible to perceive in our real-life. As Prince states: "Stereoscopic cinema gives us a glimpse into a world whose volumetric properties exceed our own in terms of their dynamic range, their vividness, and their infinite scalability. Rather than mimicking natural sight, it offers a heightening of vision, a glimpse through the looking glass into an immersive domain..." (*Digital Visual Effects* 219-20). This "immersive domain" brings the audience into the conceptual and experiential hyper-realistic mode, which is far beyond our real-life experience and perception.

Based on the above comparative analysis of the graphic violence scenes in *Dredd 3D* and *Killing Them Softly*, we may draw a conclusion that both the visual and psychological effects in *Dredd 3D* on the audience are more sensationally visceral because of the palpability and plasticity of spatial reconstruction across the 3D field screen rather than in a flat 2D screen. Ultimately, all these aesthetic and

phenomenological distinctions between 3D and 2D cinema can be distinguished by the two metaphors for the pair, respectively, an oval sphere with imbalanced dual volumes for the former and a flat canvas for the latter.

### **Expandability via Mobility: Flying in Outer Space**

Miriam Ross elaborates on the distinction between the 3D field screen and the traditional 2D screen as follows:

Stereoscopic moving images, on the other hand, take place within a 3-D field screen which exists alongside, and as an evolution of, the traditional and haptic screens. It can be understood as producing an overwhelming statement in which the audience is brought towards the screen space and taken through infinite depth planes...Significantly, the proximity of objects in the field screen threatens to engulf the audience, and this affects both vision and other senses. (“The 3-D Aesthetic” 385-6)

It is noticeable that in stereoscopic cinema this distinctive 3D field screen suggests a “habitable space”, resulting in an infinite positive parallax space behind the 3D window and a much shallower negative parallax space in front of it, since the 3D window (as boundary/frame, and also as nexus) is inserted inside the transparent oval sphere. This transparent oval sphere, as a whole, is the ontological metaphor for an illusionary stereoscopic space attributed to the 3D field screen that tends to bring the audience through it and the infinite depth planes by engendering hyper-realistic and dynamic images. As Miriam Ross puts it, “Stereoscopic images may at first seem to continue the dependence on optical vision...but once the moving images are brought to life, so to speak, the abundance of depth planes provokes an immersive effect through which the body is located within and in relation to, rather than at a fixed distance from, the content” (383). That is why some commentators call the stereoscopic space a “tangible space” for the audience (S. Ross, “Invitation to the voyage”). The “immersive effect” that “threatens to engulf” the audience is derived from the amplified stereoscopic space that engulfs the characters in the first place, which is completely different from the classical 2D film that “represents space as if telescoped within its characters” (Branigan, *Point of View* 100). As I will go on to discuss in subsequent chapters, the distinct spatial regime of 3D cinema thus has significant implications for the presentation of cinematic narrative.

Moreover, this amplified stereoscopic space is notable for its plasticity and adjustability. Aylish Wood calls it an “intangible space”, in which characters can actively transform their entangled relationalities with objects, including 3D space itself (which is often replete with digitally-generated objects and zones). Wood’s use of the term “intangible space” should not be seen as contradicting Sara Ross’s framing of “tangible space”; rather, each writer attempts to capture the affective power of a virtual space that produces real phenomenological effects. Taking on the sequence in Martin Scorsese’s *Hugo* (2011) in which the boy climbs up the clock tower to wind the station clock, Wood argues that space is not static but is shaped dynamically: “This involves considering a character’s actions as operations that configure space, as opposed to actions that only move the narrative forward. The boy Hugo is neither master of nor mastered by the spaces he inhabits, instead he and the space configure each other” (Wood, “Intangible spaces” 174). By building depth via entangled relationalities between characters and objects, 3D can therefore reconstruct “physical reality” by augmenting depth and articulating the physical movements of characters and objects.

With 3D’s unlimited positive parallax depth planes, theoretically, this “intangible 3D space” can extend to infinity. This type of “intangible space” is configured in popular 3D films such as *Prometheus* (2012), *Gravity* (2013), and *Star Trek: Into Darkness* (2013), via many scenes of human figures or objects flying, floating, or navigating in the infinite or immense environments of outer space. The popularity of such sequences seems to offer a positive answer to Sara Ross’s uncertainty: “In spite of the flight sequence’s long history as a focal point of cinematic spectacle, it is not clear whether the aesthetic model provided by the flight sequence is generalizable in a way that will help 3D finally become more than a recurrent but short lived cycle in mainstream filmmaking” (S. Ross 219). Such flight sequences, rather than existing as stand-alone aesthetic gestures, point instead to the flexible and dynamic nature of 3D space.

In this section, I will compare the metaphorical sense of space and depth in the 3D film *Star Trek: Into Darkness* (2013) and its 2D counterpart *The Dark Knight Rises* (2012). In *Star Trek: Into Darkness*, Kirk, Spock and the rest of the crew are forced to collaborate with a charismatic leader named Khan before discovering that he plans to

revive his 72 superhuman comrades with nefarious intent. In *The Dark Knight Rises*, Batman joins forces with Catwoman to foil the destructive plans of the archvillain Bane. The kinetic flying sequences in the former outer-space adventure and the latter super-hero sequel, respectively, indicate fundamental differences in terms of the figurative spatial reconstruction of physical movements in the air. An outer-space flying scene in *Star Trek*, in which Captain Kirk and the genetically engineered superhuman Khan fly together from the airlock of the starship *Enterprise* to another spaceship *Vengeance*, will be examined and compared with the opening scene of *The Dark Knight Rises*, which involves the hijacking of a CIA aircraft by the super-villain Bane and his mercenaries. I will argue that the former *Star Trek* sequence shows 3D's distinctive capacity for rendering physical mobility without a domain characterised by expandable space and exemplifies the Aesthetics of Recession while incorporating a couple of "protrusion effect" shots.

The physical flight of human bodies in the "space jump" scene in *Star Trek: Into Darkness* is mostly towards the infinite depth of outer-space. There are only two very brief shots that show the two men – Captain Kirk and Khan – flying and crossing the 3D window from the positive parallax out to the negative parallax space. These two brief but visually stunning "protrusion effect" shots engender a sense of kinetic velocity. Other shots either show the characters flying from the negative parallax to the positive parallax, or display them flying horizontally across the space behind the 3D window. It is, nonetheless, these longer and less intrusive shots that recreate the believable and boundless "physical reality" of outer-space for the audience.

These movements of human physicality not only demonstrate the vastness of the universe; they also highlight the relationalities between human physicality and other objects, such as fragments of floating space debris, scattered in numerous depth planes of the positive parallax space. These relationalities help to configure outer-space as boundless and endlessly expandable, as the two flying human bodies rapidly pass through the clusters of space debris or travel towards those located in the far background. In this way, the elasticity and expandability of an "intangible outer space" are "tangibly configured" in the limitless positive parallax ovality, which sustains both human and object movements and activities. On the other hand, although the couple of "protrusion effect" shots of Captain Kirk and Khan flying

across the 3D window into the shallow negative parallax space are powerful, they terminate the audience's concentration on the actions and events in the foreground momentarily. Here, the space of action enabled via the Aesthetics of Recession is temporarily foreclosed.

This kind of “intangible” spatiality of outer space is thus constructed via “tangible” relationalities between human physicality and objects in super-kinetic mobility. Accordingly, the narrative environment itself becomes expansible, dynamic and configurable. As Wood argues: “...building depth does not involve directly manipulating 3D space, as that would assume it has an independent existence. Instead, building depth is able to happen because it involves manipulating the material relations through which such a space exists” (“Intangible spaces” 174). As a result, filmmakers have been able not only to provide audiences with immersive, hyper-realistic viewing experiences, but also to render such spaces as domains of narrative possibility, in which the new-founded Aesthetics of Recession begin to appear (as I go on to discuss in subsequent chapters).

In the scene from *Star Trek*, the first shot of the two men being launched out of the airlock into boundless space sets the tone for the entire scene. It is a traditional establishing master shot, which also shows off 3D's capacity for presenting kinetic mobility within deep space. This shot, along with shots of the two men physically receding across the 3D window, and tracking shots of them laterally flying across the space behind the 3D window, function together not only to deepen the Z-axis dimension but also to widen the X-axis dimension and heighten the Y-axis dimension. Space in general is rendered plastic and expanded. Consequently, the illusionary “physical reality” of outer space is rendered as plausibly infinite and elastically palpable for the audience. In this context, the audience may immersively experience the hyper-realistic super velocity of human physical mobility in outer space.

The most prominent flying sequence in *The Dark Knight Rises* is the opening aircraft hijacking scene. In this spectacular action scene, the masked super-villain Bane voluntarily gets caught by CIA boarding a military aircraft, and then proceeds to kill the CIA agent and military servicemen and destroy the wings of the aircraft, with the assistance of armed mercenaries outside who jump down from a bigger aeroplane. Before the military aircraft fuselage drops down, Bane eventually gets out of it by

binding together with the hijacked Russian scientist, Dr Pavel, and they hang in the air with the wires attached to the bigger airplane, “flying” away. There had been some reports about Nolan’s resistance to making his films in 3D even before he started to shoot *The Dark Knight Rises*. “In the case of Batman, I view those as iconic, operatic movies, dealing with larger-than-life characters. The intimacy that the 3D parallax illusion imposes isn’t really compatible with that” (Nolan qtd. in Keyes, “Christopher Nolan Explains”). Although one needn’t accept the terms of Nolan’s rejection of 3D, what seems most notable is his emphasis on “intimacy”: here, he seems to acknowledge the power of 3D to make actions and experiences speak directly to the audience at the physical level.

Investigating the opening scene in terms of human physical mobility with a comparison of the “space jump” scene in *Star Trek*, the most distinctive difference is the velocity of human body movements. In *Star Trek*, the superfast motion of the two characters is reinforced by the acute spatiality of three-dimensional outer space and the enhanced directionality of physical mobility in a completely gravity-free environment. In contrast, in the aircraft hijacking scene, Nolan emphasises the innovative concept of hijacking a military aircraft from both inside and outside, thousands of metres in the sky. To succeed in flying that high, humans have to defy both the gravity of the earth and the phobia of height. In all the exterior shots, such as the armed mercenaries jumping down onto the wings of the military aircraft from another airplane, and Bane binding with hijacked Dr Pavel hanging in the air and “flying” away by attaching to another airplane, the indication of the wires tightened upon human bodies and connected with the airplane is pictorially stressed. This shows the difficulty of gravity that the mass of human physicality must conquer in order to execute such a difficult action in the middle of the sky. Here, the difficulty of the human body defying gravity while completing intensive actions as well as the phobia of height, rather than the velocity of physical movement, is emphasised. This emphasis is augmented especially when the aerial shot from Bane and Dr Pavel’s perspective registers the military aircraft fuselage falling to the ground. The height of the duet “hanging” in the air is further illustrated by the last extreme long shot, in which they are passively dragged away by the wires outstretched from the bigger airplane, rather than actively “flying”, in the wide-open sky.

Another emphasis of this opening scene is the shootout between the Bane gang and law enforcement inside the cabin of the military aircraft, which takes place in a confined and shaky space, especially after the tail of the aircraft has exploded and disappeared. The shots of these gun firings are tight-framed and brief, the camera angles are scattered, and the editing pace is quick and intense, altogether in order to accentuate the violence executed by human bodies without balance. This is a typical “post-continuity” (Shaviro, “The Pinocchio Theory”) aesthetic style sequence. Therefore, the roughly executed actions discontinuously shown in the caged space of this scene may not exert 3D’s capacity of deep space configuration of illusory “hyper-reality” whereby character physical mobility and its interaction with object movement can be volumetrically deployed.

Through the above comparison between the two “flying” scenes in *The Dark Knight Rises* and *Star Trek: Into Darkness*, we may understand the reason why Nolan has been concerned about how to deal with 3D technology in a more effective and appropriate way to benefit visual storytelling. As he remarks: “3D has always been an interesting technical format, a way of showing something to the audience. But you have to look at the story you’re telling: is it right?” (Nolan qtd. in Keyes, “Christopher Nolan Explains”). As Wood contends: “The final configurations evident in any 3D film are a consequence of a process of negotiation between the topologies of 3D space and the intentions of the film-makers to use space in particular ways to tell their story” (“Intangible spaces” 174). Therefore, my comparison of the two “flying” scenes in this section does not suggest which medium is superior to the other, but reiterates how 2D and 3D media can be exploited for different modes and techniques of storytelling. However, in terms of the recreation of “perceptual reality”, the stereoscopic immersiveness produced by constructed 3D space, along with entangled relationalities of human physicality and materiality empowered by digital technologies, together amplify illusory hyperrealism to an unprecedented extent.

## **Conclusion**

To conclude this chapter, I would like to quote Prince’s statement: “3D cinema is a stylistic mode of viewing that approximates our real-life use of stereo depth cues but invokes them at spatial distances under which we do not encounter them in the world. Accordingly, they acquire greater weight, presence, and vividness on the screen,

especially when correlated with dramatic and narrative symbolism” (*Digital Visual Effects* 218). In this way 3D cinema offers a hyper-realistic mode of authenticity, which is artificial but nonetheless creates a stereo space for the audience to experience a kind of perceptual reality and “immersiveness”. This particular experiential reality, produced by stereoscopy as a “reality effect”, is quite distinct from the “physical reality” that Kracauer saw as being redeemed by cinema. However, in its engagement with the material qualities of human vision and perception, 3D achieves a subjective redemption of objective physical existence. The experiential and perceptual reality constructed by 3D space can thus be seen as bearing a kind of “artificial authenticity”. It is both distinct from the real world that we live in, and borrows aspects from it that are not reflected in the monocular perspective of 2D cinema.

Reiterating and reinterpreting Kracauer’s original statement that the nature of (2D) film is the *Redemption* of physical reality, we may slightly revise this phrase to describe the nature of 3D cinema as the *Reconstruction* of physical reality. Based on the distinctive two-camera mechanism of stereoscopic illusionary ovality with volumetric duality, 3D cinema can not only recreate the “physical reality” in both positive parallax and negative parallax in order to reinforce the visual spatiality and directionality; moreover, it can also augment spectacle via the reconstructed “physical reality” of dynamic staging. Because of the imbalanced ovality with infinite space behind the 3D window, the elasticity and expandability of the positive parallax space always make movements and activities more sustainable and unremitting, while the powerful “protrusion effect” in the shallow and sensitive negative parallax space before the 3D window usually terminates actions and events in the foreground.

Furthermore, all the aesthetic and phenomenological distinctions between 3D and 2D cinema can be figuratively distinguished by the two respective metaphors for the pair that are encapsulated by a transparent oval sphere with imbalanced volumetric duality for the former and a flat canvas for the latter. Digital stereoscopic cinema, which has transformed itself fundamentally from its predecessors by coalescing with ubiquitous digital technologies, not only reaffirms that “cinema rests upon the foundation provided by its visual effects” (Prince, *Digital Visual Effects* 228), but also takes effects-based “perceptual (hyper)reality” to a whole new level. That is why Prince calls it an “immersive domain” (219-20) and Miriam Ross assigns

“hyperhaptic” aesthetics to 3D visuality (“The 3-D Aesthetic” 381-97), which can be ultimately described in terms of its distinctive stereoscopic mechanism of (actual or virtual) two-camera configuration - a configuration that most closely approximates the binocular vision of human beings. This alignment of human and technological vision both enables and provides a rationale for the Aesthetics of Recession. In the following chapters, I will demonstrate the ontological and narrative implications of these aesthetics.

### Chapter 3: Stereoscopic Timespaces: Directionality, Dimensionality and Temporality

...space is understood to operate in two connected ways. It acts as a space when contributing to the mise-en-scene and the integrity of the image, but it can also have a temporal dimension and so exist as a timespace. And if narrative by definition occurs through progression in time, then temporalized space can also make a temporal contribution. However, the degree to which this is evident varies from film to film. (Wood, "Timespaces in Spectacular Cinema" 374)

Though digital special effects have been applied to 2D filmmaking for much longer than in 3D cinema, such special effects arguably have a more intimate and inseparable relationship with 3D cinema. As Stephen Prince states: "Today 3D is found mainly in films that are projected digitally and are entirely CG or involve a substantial amount of digital visual effects integrated with live-action footage. Stereoscopic cinema now is a digital medium..." (*Digital Visual Effects* 204). Working intensively with digital technology, 3D cinema has firmly entrenched itself as a competing theatrical distribution form alongside 2D cinema. Alongside digital effects, 3D imagery also contributes to the creation of internally coherent visual and fictional "worlds." As Aylish Wood comments: "Across the history of special effects embedded in the continuity system, the desire for credibility has taken the form of developing increasingly sophisticated ways of showing that effects and live-action figures are integrated into the same on-screen space" (*Digital Encounters* 48). Nowadays, the sophisticated synthesis between stereoscopic visuals and digital special effects that has essentially transformed 3D cinema is displayed on two levels. Firstly, because most CG backgrounds and environments are inherently three-dimensional, they can be better integrated with stereoscopically captured live-action images<sup>9</sup>. The special effects shots, on this level, "function as props for pyrotechnical displays or as background objects," argues Michele Pierson; here, "the primary focus of art-and-effects direction is on the integration of the effect into the cinematographic space of the action. In these types of effects shots the drive for realism (and photorealism) is

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<sup>9</sup> On the other hand, Peter Jackson has observed that filming green screen on *The Hobbit* was more difficult because stereoscopic depth made the "cheating" of different heights of characters more difficult to conceal than when filming in 2D. (The Hobbit: The Desolation of Smaug, Production Diary. Video Blog. 5/12/2013. Youtube. Accessed 3/6/2016. [https://www.youtube.com/watch?v=tv1imkOqHZ8&list=PLxEb7OJne0\\_cKWPIF8srU4D-SReVF-ybn](https://www.youtube.com/watch?v=tv1imkOqHZ8&list=PLxEb7OJne0_cKWPIF8srU4D-SReVF-ybn)).

strongest” (156). The digital effects in such effects shots as Aylish Wood argues, often function primarily, “as a space” “contributing to the mise-en-scene and the integrity of the image” (“Timespaces in Spectacular Cinema” 374).

In this chapter, I will take one step beyond Chapter 2 by focusing my analysis on the second level of the fusion between digital special effects (VFX) and 3D cinema. On this level, space “can also have a temporal dimension and so exist as a timespace”, this kind of “temporalized space can also make a temporal contribution” to cinematic narratives (Wood, “Timespaces in Spectacular Cinema” 374). In other words, CGI-based films can deploy digital figures, objects and spaces that act either as narrative agents or serve to register change and transformation. In this context, various spatial ‘zones’ within the films can display different temporalities, in which time speeds up or slows down. Thus, while the spaces of digital cinema may be spectacular, they are capable of registering time. Wood’s notion of timespace therefore contradicts the common view that cinematic spectacle usually halts narrative progression, privileging space over time. Wood’s argument (“Timespaces in Spectacular Cinema”, *Digital Encounters*) reveals how timespace, especially what she calls “dynamic timespace”, can not only amplify space via spectacular sequences, but also “make a temporal contribution” to the narrative by displaying temporal dynamics.

Although Wood’s term *timespace*, which refers to “digitally constructed dynamic elements” created by special effects to allow “the interplay of character, action and space” (*Digital Encounters* 55), targets 2D spectacle films, it is also applicable to stereoscopic 3D cinema. I will use the term *stereoscopic timespace* to refer to this phenomenon, in which the accentuation of strong action and dynamic movement along various axes (X, Y and Z) creates both temporal and spatial extension. Here, time makes itself felt through the transformation, articulation and multiplication of onscreen spaces. I will discuss 3D’s capacity for rendering the dynamic movement of characters and objects in stereoscopic timespaces, and then investigate the dynamic configuration of spatial environments and the amplification of contrast between expansive and restricted spaces underlined by stereoscopic timespaces.

Therefore, I will initially introduce my classification of the two layers of

stereoscopic timespace – primary stereoscopic timespace and dynamic stereoscopic timespace. Both varieties of stereoscopic timespace are used to amplify spectacle as well as serve narrative ends by articulating spatiotemporal relations between characters, objects and environments. Afterwards, I will introduce a third type of stereoscopic timespace – subjective stereoscopic timespace (which mobilises space and time according to psychological factors). This discussion will be informed by Gilles Deleuze’s articulation of the relationship between time and depth of field (105-16). I will link subjective stereoscopic timespace with Deleuze’s notion of the *crystal-image* by analysing sequences from Ridley Scott’s *Prometheus* (2012) and Alfonso Cuarón’s *Gravity* (2013). Ultimately, I will outline the different correlations between spatiality and temporality in the three types of stereoscopic timespaces and eventually argue that digital stereoscopic 3D technology may provide art-house and avant-garde filmmakers with new opportunities to innovate through the use of subjective stereoscopic timespaces. It is important to note that such timespaces rely quite heavily on the Aesthetics of Recession – it is the extensive use of the positive parallax that allows such zones to be fully articulated as such.

### **A Taxonomy of Stereoscopic Timespaces**

Based on her comparative analysis of the digital effects-laden films *Gladiator* (2000), *The Perfect Storm* (2000), and *The Matrix* (episode I, 1999), Wood suggests that timespace refers to space that has “a temporal dimension. And if narrative by definition occurs through progression in time, then temporalized space can also make a temporal contribution” (“Timespaces in Spectacular Cinema” 374). In other words, a digital image in which digital effects merely serve the constructed illusion of realism, without extending the temporal development or attending the narrative, cannot qualify as a timespace. Not only must an effects-generated timespace contribute to the sense of temporal progression, it also must add a new dimension to narrative by functioning as a type of “narrative agency”, which interacts both with the spatial elements and with characters. Wood elaborates further on this aspect:

Two positions underlie this distinction between digital images which extend the temporality of special-effects spaces and those which secure the illusion of reality. The first is concerned with how digital effects introduce a dynamism, and hence temporality, to spatial elements: the second is concerned with how

this dynamism has the potential to institute an additional element in the relationship between the mobile agents of the narrative and the spatial elements. (374)

Therefore, timespaces can produce considerable dynamism and temporalise onscreen space, thus offering an additional dimension for narrative. In *The Perfect Storm* (2000), the digital effects render the storm firstly as a spatial background before bringing it to the forefront as the central visual and narrative element, which (like a character) interacts with other characters in multiple storylines and further advances the narrative towards the dramatic climax (Wood, *Digital Encounters* 61-63). Based on Wood's argument, this digitally generated storm now becomes a timespace and indicates "a considerable dynamism" as a mobile narrative agent by menacing human figures. Wood also suggests double articulations of cinematic technology revealed through timespaces: digitally constructed locations and awe-inspiring gestures (63). In the first case, timespaces support narrative by providing digitally-constructed spaces as environments for storytelling; the second case is more related to the notion of "immersive spectacle" engendered by the "expressive qualities of digital effects" where timespaces perform as a kind of narrative agent, a character driving the story forward (58-62). She further remarks:

...unlike approaches to spectacle that emphasize spatiality, if we think instead about the kind of technological temporality offered, the encounter is with speeding time. As the elements of the interface are embedded behind a series of conventions where storytelling and immersion are paramount, the contingency of viewing remains visible in the rush of images that seems far beyond our control. (65)

Indeed, "speeding time", or velocity, along with fierce actions and furious movement, is the main emphasis of many digital spectacles set in dynamic timespaces, which often feature chasing, flying, natural disasters or creatures attacking. The temporality of this kind of "dynamic timespace" in contemporary 2D films is often segmented, twisted, disordered, or confused, in tandem with fragmented, scattered, disarticulated spaces, constituting a difficult to grasp but dynamic spatiotemporal integrity.

This "speeding time" is highly manipulated and accentuated through "the

rush of images” crystallised by very brief shots, multiple camera angles, unpredictable movements, and fast-paced editing – an aesthetic approach which Steven Shaviro has dubbed, “post-continuity stylistics” (“The Pinocchio Theory”, “The Pinocchio Theory:...full text”). Shaviro describes a stylistic tendency in contemporary Hollywood commercial filmmaking that eschews the spatial continuity of classic cinema, choosing instead to “move ‘beyond’ it or apart from it, so that their energy and investments point elsewhere”. This aesthetic aims to immerse audiences in action scenes (“The Pinocchio Theory”).

In stereoscopic 3D cinema, however, this kind of “speeding time” and velocity might not always be exposed through “the rush of images” but rather through the enhanced volumetric depth in longer duration shots. “By making stereographic cinema viable, digital modes have encouraged filmmakers to strive for composition in depth as an alternative to the shallow-focus filming and fast cutting that predominates in contemporary planar cinema. By privileging deep focus, stereoscopic cinema necessarily emphasizes longer shot durations” (Prince, *Digital Visual Effects* 214)<sup>10</sup>. Conspicuously, stereoscopic deep focus shots with long durations that substantially enhance Z-axis spatiality (particularly in the infinite positive parallax space behind the 3D window) exemplify what Gilles Deleuze refers to as “the special quality of depth of field”. By analysing the conquest of the Babylon scene in David Griffith’s *Intolerance* (1916) and Orson Welles’s use of depth focus in *Citizen Kane* (1941), Deleuze compares the two types of depth in 2D cinema –

As long as depth remained caught in the simple succession of parallel planes, it already represented time, but in an indirect way which kept it subordinate to space and movement. The new depth, in contrast, directly forms a region of time, a region of past which is defined by optical aspects or elements borrowed from interacting planes. It is a set of non-localizable connections, always from one plane to another, which constitutes the region of past or the continuum of duration. (108)

Deleuze refers to Griffith’s depth solution in the Babylon conquest scene in

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<sup>10</sup>Also see Herbert Zettl “Why 3D May Work Occasionally: Case Reopened” in *Visual Communication Quarterly* 19.3 (2012): pp.156. (Section of *Depth of Field* and *3D Editing*)

*Intolerance*<sup>11</sup> as “depth *in* the field or image” (107). In describing “the new depth”, by contrast, he refers to Welles’s invention of a new “depth *of* field”, which is very different from the former, because it makes elements from different visual planes interact with each other, “in particular having the background in direct contact with the foreground” (107). Deleuze obviously privileges Welles’s “new depth” and asserts: “In this freeing of depth which now subordinates all other dimensions we should see not only the conquest of a continuum but the temporal nature of this continuum: it is a continuity of duration which means that the unbridled depth is of time and no longer of space. It is irreducible to the dimensions of space” (108). In digital 3D cinema, not only are these two types of depth still functional, but the intensified volumetric abundance and the dynamised planar richness along the Z-axis further enhance them in and across both parallax spaces. Theoretically, there are countless depth planes in the infinite positive parallax space, plus the much narrower but tangible negative parallax space, together forming a virtual oval sphere along the Z-axis, across which the interplay between characters and objects can be deployed. Hence, 3D’s spatial nature not only makes the Griffithian “depth *in* the field” more acute and abundant but also offers filmmakers endless depth of field to exploit and explore, just as Welles utilised its potential for dramatic staging. The expression of depth, in this case, is determined not by focus (as in *Citizen Kane*) but by the arrangement of stereoscopic planes. The impression of endless depth, together with the increase in height and width produced by stereoscopic illusion, contribute to both the formation of “a region of time” and the temporalisation of space. I will go on to argue that this temporalisation is further extended by the creation of what I will call the “subjective stereoscopic timespace”. In any case, there is an implicit linkage between Wood’s notion of timespace and Deleuze’s argument that “unbridled depth is of time and no longer space”, although they are talking about two completely different types of films. Therefore, based on Wood and in conjunction with Deleuze, we could categorise stereoscopic timespaces into three layers: *primary stereoscopic timespace*, *dynamic stereoscopic timespace*, and *subjective stereoscopic timespace*.

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<sup>11</sup> In *Cinema II: The Time-Image*, Deleuze wrote about the scene in detail: “For a long time, depth was produced by a simple juxtaposition of independent shots [*plans*], a succession of parallel planes [*plans*] in the image: the conquest of Babylon in Griffith's *Intolerance*, for instance; shows the lines of defence of the besieged in depth, from foreground to background, each with its own importance and connecting neighbouring elements into a harmonious whole” (Deleuze 107).

Wood divides the timespaces provided by digital effects into two possible categories: non-dynamic and dynamic. Non-dynamic timespace tends to emphasise spatial rather than temporal features by using special effects in the background merely to create credibility for the plot, while dynamic timespace possesses a stronger temporal quality, as the digital effects dynamise the spaces of the story-world (Wood, “Timespaces in Spectacular Cinema” 375). The first two layers of stereoscopic timespace are approximate to but not exactly the same as non-dynamic and dynamic timespaces. Basically, *primary stereoscopic timespace* refers to the image’s depth-oriented spatial directionality, dimensionality, and spatial distancing (the latter term should be understood literally, and not in relation to its use in sociology or theatre)<sup>12</sup>. This type of timespace serves as a narrative vehicle by providing stereoscopic environments for powerful movement and the actions of characters and objects, thus indirectly driving storytelling. Although primary stereoscopic timespaces may not evolve into narrative agents, they are already more dynamic and multiple than the non-dynamic timespaces described by Wood, simply by virtue of their volumetrically abundant nature. The second layer, *dynamic stereoscopic timespace*, is directly evolved from Wood’s dynamic timespace articulated for 2D cinema. This type of dynamic stereoscopic timespace usually performs as a narrative agent, a digitised character, distributed across multiple locales and directly contributing to storytelling by dynamising the space, interacting with characters, and more importantly, strengthening the temporal quality of onscreen space. However, the distinctive traits of stereoscopy determine the essential difference between character/space relationships in 2D and 3D timespaces.

In traditional 2D cinema, argues Edward Branigan, “the classical film represents space as if telescoped within its characters” (Branigan, *Point of View* 100). This “telescoped space” may allow filmmakers to manipulate the spatial scope around

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<sup>12</sup> In the context of this thesis, distancing means the optical spatial distance between characters positioned in different depth planes through dramatic staging in stereoscopic imagery. It is not synonymous with uses of the same term in sociology and theatre. In *The Constitution of Society: Outline of the Theory of Structuration*, Anthony Giddens defines time-space distancing as “(t)he stretching of social systems across time-space, on the basis of mechanisms of social and system integration” (University of California Press 1984: 377). *Distancing* can also refer to Bertolt Brecht’s alienation effect, which “counters the illusion and identification associated with classical Hollywood cinema and many other forms of mainstream cinema, and which is embodied above all in the classic realist text”, defined in *A Dictionary of Film Studies* published by Oxford University Press. Accessed 21 May 2014: <http://www.oxfordreference.com/view/10.1093/acref/9780199587261.001.0001/acref-9780199587261-e-0205>.

characters by both camera positioning/framing and performer positioning/blocking. The aim is to direct the audience to see what other objects accompany characters in a particular frame or what characters see from their perspectives, but also to determine what not to show the audience by obscuring objects or simply excluding them from the frame. A set of so-called “cheat shot” or “cheat cut” techniques based on the 180-degree rule and continuity editing principles will assure, as Branigan puts it, that “(t)he character is fully able to recapture the sense of—and become master of—its space” (100). The audience may follow the narrative by logically constituting its imaginary diegetic spaces (96). Without any doubt, movement and action in 3D cinema are still character-centered as in 2D, but they are also produced via different means, based on the exploitation of spatial capacity. Since 3D favours longer shot duration and long-scale shots with deep focus aesthetics, *mise-en-scène* is arguably more important than montage in stereoscopic filmmaking in general<sup>13</sup>; consequently, in most 3D films, characters are engulfed by the stereoscopic space rather than containing space via the telescopic logic that Branigan identifies in 2D cinema. Thus diegetic spaces, in which characters interact with each other and objects, tend to be enlarged rather than compressed in 3D.

3D also makes space available for dizzying movements, in some cases effectively turning space on its head. By integration with digital special effects, particularly in displaying images of immersive visual wonderment such as natural disasters, high-speed chases, monsters attacking, spacewalking, and the like, dynamic stereoscopic timespaces tend to become so unsteady and ungraspable that sometimes they make characters lose control of their surroundings. An extreme example is *Gravity*, in which the characters are set in boundless and gravity-free outer space during the entire course of the story. Here, the void swallows up the characters’ bodies in distorted and incoherent spatial continuums, shifting between the infinity of exterior space and the suffocating interiors of the capsules.

When temporalised space with “unbridled depth” is mobilised and

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<sup>13</sup> Ang Lee remarked in a live interview during the *3D Creative Summit* in London, UK, 27<sup>th</sup> March, 2013: “Usually when we make 2D movies...in many ways montage probably is more effective than *mise-en-scène*. But in 3D I suspect *mise-en-scène* has more upper-hands over montage.” <http://www.youtube.com/watch?v=8YXzKJu5wjw>. Accessed on 20 August 2013. Miriam Ross also noted 3D’s privilege of *mise-en-scène* in her paper, “The 3-D Aesthetics: *Avatar* and Hyperhaptic Visuality” in *Screen* 53.4 (Winter 2012): pp. 381-97.

accelerated, it can finally bring us into the virtual past or imaginary future, thus ultimately transforming the timespace into a temporal continuum – “a bit of time in the pure state” (Deleuze 82). This is the transformed *subjective stereoscopic timespace*, which is the coalescence of Wood’s timespace and Deleuze’s notion of the *crystal-image*, in which past and present, actual and virtual, inhabit the frame simultaneously. By *subjective stereoscopic timespace*, I mean instances in which characters’ subjective mentality or reflective sub-consciousness are rendered inside a stereoscopic spatiotemporal continuum by virtualising the past, present and/or the future, so that the difference between the actual and virtual becomes indiscernible. Hence, a subjective stereoscopic timespace is fundamentally distinct from the other two stereoscopic timespaces, through which the primary purpose is to produce visual spectacle as well as articulate dramatic space. The main goal for a subjective stereoscopic timespace is to project psychological phenomena in depth, so it is usually characterised not only by longer shot durations in deep focus but also dramatic interactions between characters and objects in different depth planes. Moreover, while the first two types of stereoscopic timespace work to produce what Deleuze refers to as the “movement image” (in which time is subordinated to physical and narrative actions), subjective stereoscopic timespaces make possible new expressions of the “time image” (in which time, and temporal relations, take precedence over movement). Therefore, a subjective stereoscopic timespace is a genuinely temporal domain rather than a “temporalised space”.

In summary, I will develop my discussion of the three layers of stereoscopic timespaces with reference to four digital 3D films. *Need for Speed* (2014), directed by Scott Waugh, will be initially discussed in terms of *directionality*. *Pompeii* (2014), directed by Paul W.S. Anderson, will be analysed for how *verticality* and *horizontality* work with depth to construct a total stereo *dimensionality*. My discussion of these two films will concentrate on the effectiveness of both primary and dynamic stereoscopic timespaces for the creation of stereoscopic spectacle and their interplay with narrative. Finally, with sequences from *Prometheus* (2012) and *Gravity* (2013), I will be examining *spatiotemporal* transformation in subjective stereoscopic timespaces, focusing in particular on the production of stereoscopic *crystal-images*.

### **Mobilising Directionality: *Need for Speed***

Kristen Whissel introduces her paper about “new verticality and special effects” with Eisenstein’s following statement: “neither the horizontal nor the vertical proportion of the screen *alone* is ideal for it”, because only with the conflict between both spatial tendencies can we find the optical and psychological struggle in the screen (Eisenstein qtd in Whissel 23). Here, “it” apparently means the traditional 2D screen. According to Whissel, contemporary effects films take advantage of digital technologies to introduce camera movements and spectacular compositions along the vertical axis. In *Titanic* (James Cameron, 1997), the example she discusses, this leads to new orchestrations of horizontality and verticality (as the halted horizontal progression of the stricken ship tilts towards a new vertical orientation, in which class relations are upended). In the final summary, Whissel points out that the dialectic of downward and upward associated with this new cinematic verticality symbolizes the “composites of old and new, of film and digital media” (33) amidst the digital transformation from the last decade of the 20<sup>th</sup> century through the first decade of the 21<sup>st</sup> century. Now since we have entered fully into the digital era and the 3D version of *Titanic* was released in 2012, we would have to add a third dimension—depth. In 3D films, the orientation of these dimensions produces new spatiotemporal and narrative relations.

In fact, by integrating with digital capture and special effects seamlessly, the 3D mode not only enhances volumetric depth and the spatial distance along the Z-axis; it also augments the horizontal width (X-axis) and vertical height (Y-axis) around the 3D window. Therefore, all the directions of cinematic activities in a stereoscopically constructed 3-dimensional space are amplified. This illusionary augmentation of directionality is really an advantage for digital stereoscopic cinema, allowing it to amplify cinematic spectacle much more comprehensively than 2D films do. This spatial amplification manifests itself not only through the 3D “protrusion effect”, but also across the planes of the positive parallax space, and is further spectacularised through the integration of other formal features, including kinetic movement<sup>14</sup>, fierce action and furious chase scenes, as well as techniques such as

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<sup>14</sup> Sara Ross has analysed flight sequences in *Avatar* (2009) and *How to Train Your Dragon* (2010). See Sara Ross “Invitation to the voyage: the flight sequence in contemporary 3D cinema” *Film History* 24.2 (2012): pp. 210-220. I also have a section of analysis dealing with stereoscopic flying actions, concentrating on *Star Trek: Into Darkness* (2013) in Chapter 2.

extreme slow motion<sup>15</sup> and widescreen compositions.

To a certain extent, all wide shots and extreme wide shots in 3D cinema (especially in conjunction with tracking or crane movement) produce spectacle, by enhancing volumetric depth and hence generating a type of visual pleasure that is quite distinct from those of 2D cinema. Moreover, the augmented horizontal width and vertical height associated with the 3D field screen (window) also enlarge the illusory stereo space, hence augmenting visual spectacle and increasing dramatic intensity. One of the most spectacular strategies available to filmmakers in the era of digital effects involves the development of extreme high-angle shots. The sheer verticality of these shots is enhanced greatly in 3D. Examples of vertically-oriented shots include the kinetic aerial shots of volcano ashes scattering and descending over the ancient city in *Pompeii* (2014), the series of aerial shots of the protagonist Tobey giving in on the ground and waiting for the police after winning the underground supercar race in *Need for Speed* (2014), the bird's-eye view wide shots of the solitary Pi with the tiger floating alone on the boundless sea in *Life of Pi* (2012), and the high angle wide shot of "Scotty" running a long (seemingly endless) distance horizontally to the control board of the warship USS *Vengeance* in *Star Trek: Into Darkness* (2013). All of these extreme long shots with augmented spatial depth, width and altitude, through the 3D field screen, generate spectacular views and underscore the powerlessness of human beings (tiny figures set in contrast with infinite environs). Hence these extreme long (wide) shots as primary stereoscopic timespaces not only bring out visual wonderment but also serve to underline narrative actions.

In the 3D video game adaptation *Need for Speed* (2014), mechanic Tobey Marshall is also a talented street car-racer. He and a British car dealer, Julia, have an adventurous driving trip across the continent to San Francisco in order to attend an underground supercar race, where Tobey hopes to avenge his friend Pete's accidental death two years earlier. With Julia and his old buddies' help, Tobey makes it to the competition and finally beats Dino, who was the real killer of Pete, and also proves Dino's responsibility for Pete's death. The film draws primarily on the Aesthetics of Recession, using the positive parallax to articulate relations of space, environment and

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<sup>15</sup> I have a section of analysis of 3D technique in concert with extreme slow motion aesthetics in detail exemplified by *Dredd 3D* (2012) in Chapter 2.

velocity.

I will start my analysis with a primary stereoscopic timespace scene. During the opening scene and the climatic final race scene, there are cutaways to a studio, where the race broadcast is being watched by radio host Monarch (Michael Keaton), who is also the organizer of the race. This studio scene is mostly comprised of a stationary close-up of Monarch. Occasionally, the shot angle switches to a high angle bird's-eye view of the radio host. What accentuates the close-up of Monarch, in contrast with close-ups in 2D media, is the volumetric deployment along the Z-Axis that exploits both the positive parallax and the negative parallax space. Throughout the studio sequence deep focus is maintained. The host is always positioned in the positive parallax facing the camera as he delivers his commentary. Sometimes he moves towards the lens dramatically when the race gets tense, such as when someone drives off the road; however, his head never crosses the 3D window into the negative parallax space. Otherwise, even if in a mild way, an "emergence effect" would have grabbed the audience's attention and artificially stolen the show from the parallel main car race storyline.

Nevertheless, there is a red circular spot in the upper-right corner to indicate live recording and a small cross in a circle at the lower-right corner of the screen, both of which are located slightly in the negative parallax in front of the 3D window. These two tiny signs signify "realism" by showing us that we are watching a live event. More importantly for this discussion, they augment the volumetric space along the z-axis by enhancing the conspicuous distance between the camera in the negative parallax and the host's main action in the positive parallax. By so doing, the confined small studio has been augmented in depth as a primary stereoscopic timespace. Along with the occasional bird's-eye view shot (without the recording signs) from above the host, which emphasizes the acute spatial distance vertically, the tiny studio is presented as an essential narrative locale that interacts indirectly and in contrast with the main car race event happening on the mountain road. It also constitutes an oddly confined but volumetrically rich studio environ, which produces a distinctive sense of visual wonderment that both contrasts with and complements the more dynamic spectacle of the race itself.

It is worth noting that the spectacle here inside the studio is not generated by

the “protrusion effect” such as having the host’s head or his hands poke out at the audience. The spectacle is rather entailed by intentionally maximising the distance along the z-axis, so that both spatial depth and vertical height (when the camera is above the radio host) are increased. As a result, Monarch’s actions behind the 3D window are accentuated while the tiny recording signs in the negative parallax space are merely laid out as a foil. But this collateral ornament is very important so as to not only construct a genuinely stereoscopic space with volumetric depth and spatial duality, but also temporalise this confined tiny studio by showing “live time” in comparison with the “speeding time” of the intercut car race. Here, studio time is slow in relation to race time, constituting the studio as a distinct timespace. Each of these two locales (interior studio and exterior mountain road) works differentially to drive the parallel plots forward. The development of the race is narrated through the alternation between action and commentary, speed and inertia. These interspersed timespaces intensify the sense of speed and danger associated with the race. The differences in speed are also expressed spatially: while the race scenes maximise the scale of horizontal and vertical movements across the frame, the studio is a contained space. The host’s close-ups become a sort of infrequently deployed spectacle, as opposed to the discomfiting effects that 3D close-ups usually produce, especially when fiercely intruding into the audience space. In tandem with the slightly ornamented swell (via the recording signs) in the negative parallax space, the integrity of the studio scene as a primary stereoscopic timespace emphasises both space (via augmentation) and time (via contrast with the race) to render spectacular effects and drive narrative.

*Need for Speed*’s numerous car racing and chasing sequences exhibit kinetic movement and super fast speed. Driving a car is not only about movement and speed, but is always related as well to direction and space. Especially for the underground car competitions depicted in the film, although speed is the final measure to judge who is a better driver, how to control the direction in a complicated and dangerous space is the key to achieve final victory. Hence, in a film about driving and speed like *Need for Speed*, the stereoscopic mode facilitates an exploration of extreme velocity and wild movement based on 3D’s capacity for augmenting spatial depth, verticality and horizontality. Speed thus becomes expressed via directionality: trajectories of movement (horizontal, vertical and deep) are counterposed to emphasise differences

in distance and spatial orientation. For example, in the racing scene that finally leads to Pete's death, Dino challenges Tobey and Pete to have a three-car race from his mansion to a bridge over a highway. Tobey leads towards the bridge while Pete takes second place and Dino is left behind. During the entire scene, all the short cut-together shots of furious chasing, aggressive passing and dodging with other cars from the opposite direction emphasise contrasting trajectories of movement a feature that is amplified by the use of stereoscopic depth. The sense of kinetic velocity is further enhanced by the sharpness of the extra-HD digital imagery.

Whereas these are examples of primary stereoscopic timespaces (in which artificial spaces provide environments for time and narrative), the film also features dynamic stereoscopic timespaces (in which time and space become active forces, interacting with characters and shaping actions). The film's most spectacular segment comes from two long shots in concert with extreme slow motion to illustrate Pete's death and Tobey's witnessing of the cruel tragedy. About to reach the bridge, an exasperated Dino suddenly tags Pete's car from behind, which results in Pete's racecar spinning out of control and launching into the air before exploding in fire. This low-angle long shot emphasizes the vertical height of Pete's car launching forward; then, with the addition of extreme slow motion, time seems to have decelerated and the fierce explosion of Pete's car is acutely sharpened and dramatically intensified. Following a close-up of Tobey staring at the rear mirror, another long shot indicates that Tobey sees Pete's car floating and exploding in the air through the rear mirror, which emphasizes the amplified directional distance between him as the front runner and Pete's exploding car behind him. The explosion, created through CGI, is unnaturally crisp and detailed. This enhanced acuteness of the explosion and the amplified directional distance emphasizes the tragedy of the event. This is further underlined by Tobey's spatial situation. He is in the same site with Pete and witnessing his car in flames (assuming he is dying); however, because they are distantly separated due to the sheer spatial interval in between, Tobey can do nothing to save his friend's life. Moreover, by intercutting this spectacular long shot with Tobey's shocked and saddened close-ups, it stresses Tobey's powerlessness and traumatic sorrow under this extreme circumstance. The use of slow motion to enhance the explosion only accelerates the tragic intensity and increases Tobey's helpless and traumatic feeling when witnessing his friend's fatal accident, hence foreshadowing his

later determination to avenge Pete's death. Although this long shot is a reflection manifested through the rear mirror of Tobey's car, the stereoscopic spectacle is engendered by augmented directionality and magnified depth, reinforced by the alternation between slow motion and normal speed, which connects characters and actions in the two narrative spaces emotionally but distances them visually. The scene itself knits together different timespaces, not only producing spectacular effects of slowdown and acceleration but also making affective and narrative connections: here, the character's helplessness and emotional trauma are communicated through relations of speed and distance. Furthermore, the use of slow motion together with contrasting spatial directions and relations effectively temporalises space, turning the timespaces of this scene into dynamic agents of narrative articulation.

There is another example from *Need for Speed* that reveals the spectatorial pleasure engendered by stereoscopically enhanced directionality and the consequent distancing and spatial augmentation through the dynamic stereoscopic timespace. On their trip driving to California to attend the supercar competition, there is a scene in Detroit, MI where the police cars chase Tobey and Julia in their racecar. Surrounded by police cars from all directions and facing a main street in the front, the car driven by Tobey suddenly flies over other cars, trees, and concrete obstacles on the road toward the audience; however, it eventually restrains from "crossing the line" (i.e. flying into the negative parallax). With the image's volumetric abundance and the acutely directional distance, amalgamating with extreme slow motion technique, this spectacular shot increases the chasing intensity to the peak moment and indicates the impending danger by amplifying the height of their car flying into the air and its falling towards us. For a moment many spectators (especially frequent 3D cinema-goers) might expect the flying car to protrude into the negative parallax; however, the film cuts to a long shot which shows their car receding to the far-off background over a bunch of obstructions and then landing in the deep planes opposite. This long shot thus becomes both an optical and psychological surprise for the audience. Therefore, when the next interior two-shot shows the couple inside the car safely landing and Julia's relaxed facial expression, the audience finally gets paid off with more emotional and empathetic satisfaction and is simultaneously as awed as Julia by Tobey's driving skills, boldness, and determination.



**Figure 3.1** *Need for Speed* (Scott Waugh, 2014) In the scene in which the police chase Tobey and Julia, Tobey launches his racecar over many vehicles on the main street and then lands on the ground safely. In this dynamic stereoscopic timespace demonstrated in extreme slow motion, Tobey's racecar recedes towards the deep planes in the background, instead of protruding forward and flying towards the audience.

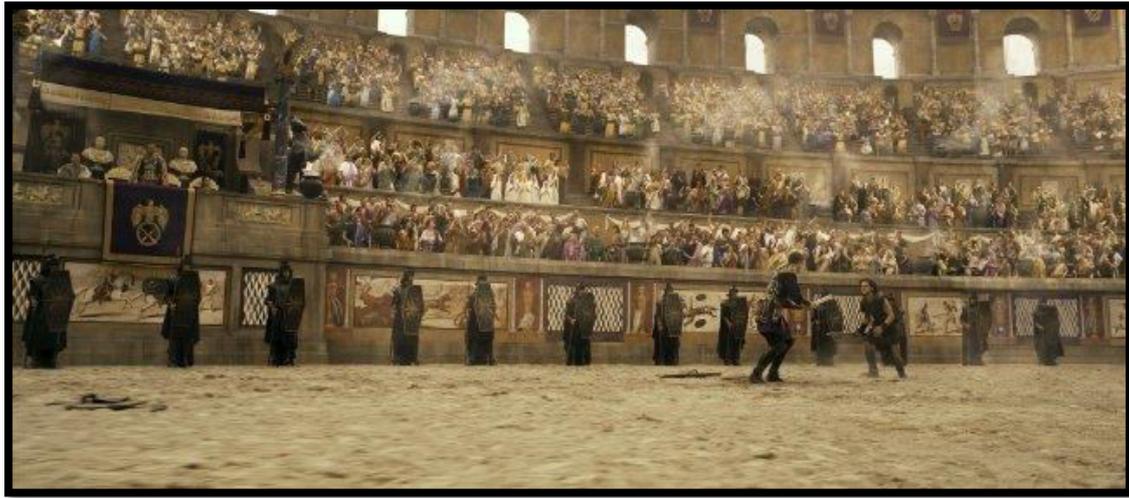
This spectacular chase sequence, especially the climactic moment and the consequent release entailed by the car receding into the distance, is a quintessential example of dynamic stereoscopic timespace's potent effectiveness. It constructs visual spectacle by enhancing directionality stereoscopically, resulting in the augmentation of spatial depth, verticality and horizontality. Once again, the oscillation between different speeds and trajectories of movement produces dynamic timespaces, which directly address both the characters' and spectators' perceptual and affective alignments.

In some film genres, such as historical films and sci-fi epics, the range of themes and scenarios seem to call for multiple perspectives and dimensions. 3D cinema, I argue, may contribute to multiplying both the perspectives and dimensions, by integrating with digital special effects to generate both primary and dynamic stereoscopic timespaces. I shall articulate 3D's contribution to multiple perspectives in chapter 5 when I discuss stereoscopic narrative perspectives. In the next section, I will focus my analysis on stereoscopic cinema's tremendous emphasis on multiplying spatial dimensionality and incorporation with dynamically unfolding temporality, not only to bring out large-scale historical disaster spectacles dynamically but also to reveal their thematic significance.

### **Complementary and Competing Timespaces: *Pompeii***

From focusing on stereoscopic directionality (in terms of the orchestration of movement and space within and across frames), I will now turn to the question of how different stereoscopic timespaces work, both together and in contrast, to amplify dimensionality (by which I mean the impression of magnification, not only in depth, but also along vertical and horizontal dimensions). In particular, I will use the 3D historical disaster movie, *Pompeii* (2014), to examine how the primary “human timespaces”, which illustrate the brutal gladiatorial spectacle and dramatic intensity, are interrupted by the dynamic “natural timespaces”, which highlight the powerlessness of human beings when encountering natural forces. While the primary stereoscopic timespaces provide the stage for human conflicts, the dynamic stereoscopic timespaces reframe human temporality, bringing both historical and geological forces to the forefront in the context of digitally transformed 3D spaces. The nexus of the two kinds of timespaces (primary and dynamic) is where the progression of human history coincides with the eruptive movement of geology. In the aftermath, human class relations are upended.

The story in *Pompeii* follows a slave-turned-gladiator, Milo, who attempts to win the love of Cassia, the daughter of Pompeii’s ruler, from the brutal Roman senator Corvus. The film also depicts Milo’s friendship with fellow gladiator Atticus, who has one battle to win in order to be a freeman. However, the eruption of Vesuvius changes all these characters’ destinies. Corvus abducts Cassia and escapes from the ruined city on a chariot. Leaving Milo to save Cassia, Atticus fights with Corvus’s guard Proculus. They mortally wound each other and Atticus dies, finally a freeman, as the lava wraps them up. Amidst the chaos following the eruption, Milo rides a horse to chase the chariot and finally wounds Corvus and chains him outside the ruined city, waiting for death. Milo and Cassia then gallop out of town on a horse; realising it is too late to outrun the engulfing pyroclastic surges, they decide to die in each other’s arms. Against the backdrop of the well-known destruction of the ancient city Pompeii by the eruption of Vesuvius, the filmmakers attempt to tell a touching story about love and freedom by fusing factual history with fictional elements through a mixture of multiple genres: historical, disaster, and sword-and-sandal epic.



**Figure 3.2** *Pompeii* (Paul W.S. Anderson, 2014) In this sword fighting scene between Milo and Corvus's officer Proculus, displayed from a low angle deep focus long shot, the duo fighting in the foreplane are acutely distinguished from spectators on the bleachers in the distant planes.

“Sword and sandal” epics have long made use of new technologies in order to amplify spectacle. *Ben-Hur* (William Wyler, 1959) energised its intense and spectacular chariot chase scenes by deploying multiple cameras and taking full advantage of recently-popularised wide-screen technologies. *Gladiator* (Ridley Scott, 2000) adopted digital effects to manifest the goriness and cruelty of its swordfights and to exhibit the splendour and scale of the gladiatorial arena. In *Pompeii*, the main contribution to the gladiatorial combat scenes also involves scale. In the first gladiatorial battle scene, Milo, Atticus and their fellow gladiators are outnumbered by a team of rival gladiators who are posing as Roman soldiers (in order to reenact Corvus's “glorious triumph” in a previous battle). Milo and Atticus cooperate to defeat their opponents, concluding the fight as the only two survivors of the slaughter engineered by Corvus. During the battle, a timespace of brutal physical competition is organised around a stony column in the centre of the colosseum. This alternates with the space of spectatorship, particularly in the VIP seats, where a dramatic conflict takes place between Corvus and Cassia: he extorts her to agree to a marriage with him. These two intercut primary timespaces of brutal battle and dramatic spectatorship interweave with and complement each other to attract and direct the audience's attention.

A high column erected on the central battleground acts as a concrete measure of the scene's volumetric depth, vertical height, and horizontal width; the sheer

physical verticality of the column also provides an a measure of class stratification, since the characters are oriented in relation to it (initially at least, the rulers are level with the top, and the gladiators with the bottom). The two interwoven primary stereoscopic timespaces make the spectatorial atmosphere of the gladiatorial combat resonate with the intense drama that takes place in the VIP area of the arena, and vice versa. The two timespaces (battleground and VIP area) operate according to compatible rhythms, with shifts in pace orchestrated across the scene. In contrast with the divergent temporality of the studio in *Need for Speed*, which is slowed down in relation to the parallel exterior race time, the “VIP area time” of the scene is defined not simply by inertia but instead follows a more dramatic pattern, resonating with the intensive pace of the battleground. The two resonantly temporalised spaces, both independently and in association with each other, drive the entwined plots forward and contribute to the spectacular battle. The battle scenes underscore the fierceness and brutality through agile character actions, kinetic camera movements, and traditional shot/reverse shot compositions. Consistently maintaining the rhythms of its respective timespaces, the scene retains the flow of both narrative and spectacle.

In this arena, the shifts in power between the “low” and “high” characters are expressed spatially, as two slaves cooperate with each other and reclaim the “glorious triumph” from the Roman armies. After Milo and Atticus chop down the high column, which represents the “superior glory” of the Roman Empire, in a stereoscopically enhanced high angle long shot, they stand on the rocks shoulder-to-shoulder, temporarily equating their position with Corvus – the Roman senator and Cassia family – the ruler of Pompeii. In this respect, the film mirrors a spatial/narrative dynamic found in a number of other effect-based films, as suggested by Whissel in her analysis of *Titanic* (1997). Specifically, the dramatic upward and downward displacement pictorially manifests “verticality’s spatial dialectics to represent mythologized historical pasts defined by the violent opposition of polarized (political, economic) extremes” (26). The upward rise of Milo and Atticus as the lowest social class (slaves), and the downward falling column as the symbol of the powerful ancient Roman Empire, spatially accentuates the imminent historical moment of upended class relationships amidst the social unrest. This bidirectional vertical movement parallels Whissel’s analysis of *Titanic*:

As *Titanic* suggests, verticality's spatial dialectics and dual movement allow it to mobilize extremes, elaborate struggles for and imbalances in power, and accommodate contradictory interpretations of each. In this way, verticality dramatizes and makes pleasurable the (spectatorial) position of being caught in the middle of violent conflict between polarized extremes, whatever its outcome. (27)

In *Pompeii*, "verticality's spatial dialectics" are not only incarnated by bidirectional vertical movement, but also expressed by volumetric depth, which emphasises speed and scale in order to dynamise "mythologized historical pasts". The vertical movements that bring Milo and Atticus level with their imperial rulers thus foreshadow the overturning of class relationships (whether through violent fights or romantic affiliations) that will occur under the pressure of disastrous circumstances.

Later in the film, the primary timespace of the arena is interrupted by the emergence of dynamic timespaces. In the battle scene between Milo and Corvus's guard Proculus, the erupting volcano Vesuvius becomes a kind of "character", intervening actively in the narrative and interrupting the temporal rhythms of the duo's sword-fight. As Wood contends: "There are two consequences to this use of timespace. The first is that dynamic digital effects introduce an additional element to the narrative — a different kind of mobile agent. This in turn leads to the second idea that in spectacular cinema using dynamic digital effects the images are built around competing elements" ("Timespaces in Spectacular Cinema" 377). Here, the "human" timespaces (of battle between Milo and Proculus, and spectatorship) are suddenly interrupted by another type of timespace – the CGed eruption of volcano Vesuvius, which is associated with the natural world. This type of "natural" timespace introduces not just another "competing element" (in the form of the CGed lava ash, earthquake, etc), but also redefines temporal experience altogether – a comparatively steady primary timespace is disrupted and turned into a dynamic timespace. A similar disruption is associated with the flooding seawater in the following scenes, in which a tsunami swallows Pompeii.

Indeed, these "natural" timespaces not only compete with but also transform the primary "human" timespaces into dynamic stereoscopic timespaces, since digital elements have moved to the foreground from a mere background component and now

participate as virtual characters, directly interacting with other narrative elements across multiple locations. When Milo and Proculus first fight each other in the colosseum, Vesuvius is only a component of the narrative environment standing in the deep background. When the volcano erupts, the transition from primary to dynamic timespace is marked by a series of slow motion shots, in order to highlight the point at which the new volcano “character” interrupts the ongoing event. Here, volumetric depth amalgamates with slow motion to temporalise the descending trajectory of the thick lava ash. It thus represents the scale, speed and power of this natural force in the immediate moment but also the “deep time” of geology, which dwarfs human history.



**Figure 3.3** *Pompeii* (Paul W.S. Anderson, 2014) In the gladiatorial battle scene, Milo and Atticus fight together and finally declare victory by tearing down the column on the rocks and standing staunchly atop it.

These shots of the volcano erupting in slow motion are intercut with close-ups showing the astonished expressions of three characters (Milo, Proculus, and Corvus). These close-ups are also in slow motion, underlining the awe-inspiring moment, which becomes the turning point of the transformation from a primary stereoscopic timespace to a dynamic one. The slowing down of time foregrounds a shocking moment for both Milo the slave and the Roman rulers, and thus stresses the powerlessness of all human beings in front of natural disasters. This moment also represents a historical tipping point where the eruption of natural power coincides with human social revolt. Viewed from a historical perspective, the momentary shock of these men’s expressions caused by the volcanic eruption is as timeless as the

momentary intimacy between Milo and Cassia before the natural disaster engulfs them in the end of the film.

The interaction of competing timespaces produces further actions and reactions across multiple spaces and reshapes the characters' motivations and desires. The eruption drives the fighting rivals down to the underground prison level, where they continue to fight each other; however, their motivations are completely upended: Proculus has to fight for his life while Milo and the other released gladiators fight for their revenge and freedom. This overturning becomes another example of what Whissel calls the "new verticality" of digital special effects; as in *Titanic*, it is here associated with the upending of class relations at moments of historical change.

The scene of seawater swallowing Pompeii is another example of how dynamic "natural" stereoscopic timespaces irrupt into primary "human timespaces". Here, nature's advantage is expressed both spatially (it transforms the city) and temporally (it moves at great speed and also represents the "deep time" of geology). The stereoscopically enlarged slow motion waves are spatiotemporal threats: they cannot be outrun but also imply a geological "deep time" that goes beyond human history. Therefore, this competition between "human timespaces" and dynamic "natural timespaces" becomes a one-sided contest that favours the latter. As a result, human temporality is reframed in the context of digitally transformed 3D spaces.

Before this seawater scene happens, a series of small disasters are displayed through dynamic stereoscopic timespaces: volcanic ashes and lava are depicted blasting and scattering in all directions over Pompeii in several long shots taken from various angles (low angle, high angle, and eye-level). These shots amplify the dimensional scale of the eruption by projecting its effects in multiple directions across 3D space. The most striking images are lava fireballs with thick and long smoky tails that fly over the city vertically or horizontally in the foreground with the arena in the deeper planes, and the ashes spreading volumetrically into both foreground and background in depth along the Z-axis. Soon after, the arena and other buildings collapse one by one and constitute a new vertically descending movement. This contrasts with the horizontal movements provided by the lava fireballs flying across the positive parallax space.



**Figure 3.4** *Pompeii* (Paul W.S. Anderson, 2014) Lava forms fireballs with long smoky tails, which fly like bombs over the city of Pompeii from different directions.

All these disastrous spectacles drive people rushing to the harbour, while the seawater, as a background of both narrative and spectacle thus far, has remained comparatively stable and less dangerous. Later, the CGed tsunami suddenly intrudes into the harbour and becomes another competing element, a newly formed destructive force in the narrative, which now gains prominence over the others and begins to form a forceful dynamic stereoscopic timespace. The sinking of the escaping boats by the tsunami is illustrated by one protrusion effect shot of the stormy seawater gushing into the negative parallax space, in comparison with most shots, which emphasise the receding waves in the positive parallax space. However, it is not until the seawater floods Pompeii, swallows its sea watchtower, and surges into the town streets against the running crowds and then chases them, that the unstable constitution of this dynamic stereoscopic timespace takes full effect. This disastrous seawater has moved forward from the background and transformed into a powerful character, across multiple locales, directly interacting with competing human figures, hence causing both a spectatorial reversal and a narrational twist.

The temporal aspect of the seawater's intervention is underlined by the use of slow motion, which amplifies the sense of awe as well as pointing towards the time differential between human and natural forces. However, this should not be seen as an anti-narrative deployment of spectacle. Instead, the slowing down of time contrasts with Atticus's desperate, hurried attempt to save a little girl from the tsunami, and thus increases narrative intensity. Here, the orchestration of competing timespaces,

engendered by the organic integration of stereoscopic 3D techniques and digital special effects, serves both spectacular pleasure and narrative progression.

**“Crystal-Image”: Subjective Stereoscopic Timespaces in *Prometheus* and *Gravity***

The 3D sci-fi adventure *Prometheus* (2012) is acclaimed filmmaker Ridley Scott’s first foray into 3D filmmaking and digital capture. By deliberately increasing the positive parallax space behind the 3D window, and incorporating deep focus extreme long shots, depth-oriented mise-en-scène arrangement and digital VFX, Scott is able to enhance directionality and three-dimensional spatiality, creating a terrifying and awe-inspiring cinematic spectacle. Moreover, the sci-fi genre provides Scott a tremendous opportunity to investigate the origin of human life as well as for the audience to recollect the cinematic past: Scott’s 1979 original sci-fi film, *Alien*, as well as Stanley Kubrick’s 1968 sci-fi classic *2001: A Space Odyssey*<sup>16</sup>. Dariusz Wolski, the DP of *Prometheus*, comments that he “was subconsciously repeating certain shots that had impressed me” from *Alien*, and admits that he “thought a lot about *Alien*, as well as Stanley Kubrick’s *2001: A Space Odyssey* (1968). It’s hard not to be influenced by those films — they’re the reason so many of us became filmmakers, and they stay with you” (Benjamin B: 2012). In *Prometheus*, a group of scientists travel to outer space on the spaceship *Prometheus* in the year 2093 in order to seek out an answer to the question, “where does life begin?” Therefore, the present in the film is set during a future adventure in outer space, in which the answer to a question regarding human beings’ original past is very important to our future.

Similarly, *Gravity* is also director Alfonso Cuarón’s first 3D film and a sci-fi adventure in outer space. The film is about a female astronaut, Dr. Ryan Stone, surviving a fatal calamity caused by a cloud of debris in space that destroys the space shuttle, after which she ultimately manages to safely return to earth. On one hand, the

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<sup>16</sup> During an interview with *Playboy Magazine* (September 1968), when talking about his sci-fi movie *2001: A Space Odyssey*, Kubrick says: “When you think of the giant technological strides that man has made in a few millennia—less than a microsecond in the chronology of the universe—can you imagine the evolutionary development that much older life forms have taken? They may have progressed from biological species, which are fragile shells for the mind at best, into immortal machine entities—and then, over innumerable eons, they could emerge from the chrysalis of matter transformed into beings of pure energy and spirit. Their potentialities would be limitless and their intelligence ungraspable by humans.” <http://web.archive.org/web/20110603065523/http://www.playboy.com/articles/stanley-kubrick-interview/index.html?page=2>. (Accessed 25 April 2014). In *Prometheus*, based on the above notion, Ridley Scott designates the different degrees of biological species: superior alien, humanoid robot (incarnated by David) and human beings. The previous two species are superior to human beings both intellectually and physically.

film is recounts the survival of a present calamity; on the other hand, it is more profoundly about how to deal with the traumatic past when we consider Ryan's loss of her four-year-old daughter before the mission and her loss of fellow astronaut Matt Kowalski, who sacrifices himself for her life after the accident. Since the two films are both dealing with the present and the past (as well as the future), and they both adopt stylish long takes with deep focus aesthetics, we may apply Deleuze's notion of crystal-images based on dramatic staging, linked with "the special quality of depth of field" from sequences in both films. Although Deleuze applies the term "crystal image" primarily to works of cinematic high modernism, I argue that aspects of the crystal image can be found in contemporary popular cinema – and that both spectacular digital effects and 3D provide particularly conducive contexts for its emergence.

Deleuze defines the crystal-image as follows: "The crystal-image may well have many distinct elements, but its irreducibility consists in the indivisible unity of an actual image and 'its' virtual image" (78). Certain films play upon this combination of actual and virtual, of images that occupy the present and those which refer to the past or the future (and are hence associated with dreams, fantasy, imagination, and a general sense of the conditional or subjunctive). "The crystal-image is, then, the point of indiscernibility of the two distinct images, the actual and the virtual, while what we see in the crystal is time itself, a bit of time in the pure state, the very distinction between the two images which keeps on reconstituting itself" (82). Richard Rushton further elaborates: "the indiscernibility between the real and the imaginary, the present and the past, the actual and the virtual, becomes an objective 'fact'. As Deleuze states, when this occurs, what was virtual now becomes actual while what was actual correlatively becomes virtual: the actual and virtual become entwined to the point where we can no longer tell which is which" (Rushton 89). Therefore, indiscernibility is one of the key words to understand and interpret Deleuze's crystal-image. It is also important to comprehend that the meanings of "the actual" and "the virtual" do not align with "the true" and "the untrue", but are rather inclined towards "the real" and "the unreal", or "the imaginary".

Ronald Bogue elaborates on the crystal-image like so: "...as Deleuze develops the concept of the crystal-image he moves insensibly from optical illusions

to artistic illusions, speaking first of objects and their mirror reflections, and then of actors and their roles, as means of understanding the coalescence of virtual and actual in a single image” (Bogue, “To Choose to Choose” 120-1). Based on Bogue’s account, Deleuze’s crystal-image can be adopted to describe a whole piece of work as well as to analyse a single image, a scene or a sequence of images, as I will do in relation to the two examples of *Prometheus* and *Gravity*.

Interestingly, Deleuze states in his second *Cinema* book: “It is the time-image which calls on an original regime of images and signs, before electronics spoils it or, in contrast, relaunches it” (267). Here, with the word “electronics” Deleuze might not have been referring to digital images *per se*, yet we can of course regard these as an extension of the electronic. Nowadays cinema has already transformed into digital mode, with digital stereoscopic 3D movies as a prime example. I want to suggest that digital 3D cinema is capable of “relaunching” the time-image. “As a genealogical force, the time-image has no history in the usual sense. Appearing as a nonchronological force, what it expresses is an Event wherein each passing present yields to the unforeseeable, the unpredictable, and the emergence of the new” (Rodowick xvii). In Ridley Scott’s *Prometheus* (2012) and Alfonso Cuarón’s *Gravity* (2013), it is possible to find certain sequences and scenes, which “relaunch” Deleuze’s crystal-image through the deployment of transformed subjective stereoscopic timespaces. Next, I would like to discuss the appearance of stereoscopic crystal-images in such subjective stereoscopic timespaces, using as examples the hologram scene in *Prometheus* and the scene in *Gravity* in which Matt Kowalski reappears in the capsule.



**Figure 3.5** *Prometheus* (Ridley Scott, 2012) The galaxy symbolises the eternal universe while those the circling stars and small planets metaphorise the many “seeds”. The numerous orbits suggest the “relative circuits” for the actualisation of crystal-images, moving between the actual and virtual.

The hologram scene in *Prometheus* takes place in the control room of the alien structure, where the humanoid robot David (Michael Fassbender), who acts as a mediator between humans and the aliens, interacts with the dazzling galaxy hologram and the aliens inside the hologram. Because there is no premonition for this fantastical hologram’s fluorescent revelation, nor reason for its sudden disappearance, this scene resembles a virtual contact with the aliens, imagined from David’s subjective perspective. The appearance and disappearance of the shining and circling galaxy hologram is seemingly controlled by a vague-shaped alien sitting on the throne at the lower-right corner, which confirms the scene’s virtual status and the aliens’ superiority to both human beings and David. Since David can speak the alien language and communicate with them, he is superior to mankind both physically and intellectually. The fantastical galaxy, as “a pure optical and sound perception” and also a visual spectacle for the audience, displays the infinite and eternal universe we live in, extending beyond human life and history. David is amazed by the wondrous spectacle around him after he steps into the rotating and dazzling galaxy hologram. After momentarily communicating with the passing-by aliens, the mirrored virtual image inside the crystal and still crystallising galaxy, David holds up a miniature holographic earth. In comparison with its vast surroundings, it is indeed very small. Shortly after, David lets go of the miniature earth, which rejoins its rotating trajectory with other planets around the shining sun.

The numerous “seeds” (stars and planets) and the “relative circuits” (circling orbits among and around the “seeds”), rendered volumetrically as a kind of eerie continuum, actualise the conflation of the past and the present. David himself appears as an actual image, a robot who occupies a place within the present tense of the narrative. At the same time, his appearance and manner closely resemble that of T. E. Lawrence, as played by Peter O’Toole in David Lean’s *Lawrence of Arabia* (1962). Earlier in the film, a clip from Lean’s film (in which Lawrence reveals how he can stand the pain of being burnt by a match) makes this link explicit. Hence, Lawrence as the imaginary virtual image exists simultaneously in David’s actual gestures and facial expressions. In addition, the image of the past is constituted by the virtual aliens, which, in their obscure shapes, mirror David’s figure and therefore serve as premonitory “drafts” of humankind’s present form. Inside the galaxy hologram, David in the middle depth plane coexists and constantly interacts with the two moving aliens in the deeper background and the “controller” alien in the foreground plane, by listening to their speaking. Even though we as audience cannot understand what the aliens murmur, we are forced to pay attention to them temporarily when they move in the deeper planes; nonetheless, they disappear quickly from the background and then our perceptual focus turns to David during most of the scene. However, the exchange and constitution of the virtual past and the actual present is indiscernible in terms of the tacit communication between the virtual aliens and David.

It is noticeable that neither the earth and the sun nor David is in the centre of the circling galaxy, which is visually consistent with a scientific viewpoint on the cosmic system and a non-centrist view of human beings in the universe. The stereoscopic long shots, along with close-ups of David’s amazed expression, in concert with digital special effects, reinforce the volumetric depth and further the acuteness and vividness of character interactions among depth planes in this fantastical, subjective stereoscopic timespace – David’s illusion of a miniature universe created in the alien structure (ship/tomb). This stunning stereoscopic timespace not only underlines the diminutive stature of human beings in relation to the whole universe but also accentuates the infinity and organisation of the pre-existing cosmos even before human life began. Simultaneously, the dazzling subjective stereoscopic timespace has crystallised the formation of a pure temporal domain as a spiritual continuum, for we suddenly realise the eternity of the universe,

the briefness of human life and human civilisation within the eternal universe, through this stereoscopic crystal-image. Both the past and future become virtually open while the present retains a sense of the actual presented by David's concrete presence in the scene. According to Deleuze, "[t]ime consists of this split" between the past and present, "and it is this, it is time, that we see in the crystal" (81).

*Gravity*, drawing on extraordinary use of digital effects, simulates the experience of human beings in outer space. Using stereoscopic aesthetics to enhance the spatial dimensions of its mise-en-scène, the film succeeds in turning space on its head. Stereoscopic devices, integrated with digital special effects, create primary and dynamic stereoscopic timespaces in order to demonstrate visually striking spectacles such as a cloud of incoming space debris, the crash of the space station, a fire raging inside the capsule, and Dr. Stone's final return to earth. Next, however, I would like to concentrate my discussion on the films' creation of stereoscopic crystal-images and subjective stereoscopic timespaces. Because the digitally-modified long take is the most prominent formal element in this 3D film, and the infinite depth in the positive parallax space provides the greatest possibility for dramatic staging of the interactions between characters and objects in the vastly boundless void, this film is able to take advantage of what Deleuze refers to as the "special quality of depth of field", thus providing certain conditions for the emergence of the temporal. Besides, one of the film's themes is how to deal with and overcome the traumatic past in order to survive the present calamity, which entwines the past and present to a certain extent. Although it is true that the film's ultimate resolution of this narrative problem (the main character's unprocessed grief) puts it at odds with "time image" films, which tend to leave such problems unresolved, the film's exploration of past-present relations leads to specific manifestations of the crystal-image at key points in the film.

Two extreme long takes are especially impressive and memorable in *Gravity*: the opening scene, which runs for about 13 minutes, and the scene starting at 57 minutes that exceeds 10 minutes and delivers the second plot point of the film. My analysis will focus on the latter, which includes two sequences in one take: Dr. Stone's virtual communication with someone on earth and Matt Kowalski's return to the capsule and subsequent discussion with her. Before this scene, since Dr. Stone has failed to launch the Russian spaceship *Soyuz* and called Houston many times without

getting any response, she becomes desperate and sad. The sound of a man talking, laughing, and singing, alongside his dog barking (heard via the capsule's communication system), builds up the remote off-screen space and enlarges it to an extreme degree, which actually enhances the huge contrast with the suffocating space of the capsule where Dr. Stone is stuck. The slowly drifting camerawork strictly keeps a medium-close frame on her when she is barking and talking to herself in tears, which further emphasises the suffocating and claustrophobic atmosphere and her desperation, by combining with the vertically floating helmet in the fore plane and the dropping pen in the deeper plane close to her. However, it is not until the baby's crying appears on the radio that we start to know Dr. Stone is not only stuck in the present capsule but is also, crucially, stuck in the past trauma of losing her daughter, a trauma which is as deep as the vast space outside.

But the "sheet" of this traumatic past has stealthily turned up even earlier before the sound of the baby's crying appears. While Dr. Stone is crying, a tiny crystal teardrop floats forward from her face, becoming bigger and bigger while slowly travelling along the Z-axis and slightly across the 3D window then floating out of frame via the upper-left corner. Moreover, when this stereo teardrop is about to cross the 3D window, the image focus is ratcheted onto it from Dr. Stone herself in the deeper plane, so that we can see more and more clearly the virtual reflection of her, suspended upside-down inside the teardrop. This upside-down virtual image in the CGed teardrop is similar to the reflected image of her in Matt Kowalski's wrist mirror when she first tells him about her daughter's death. This depth-staged subjective stereoscopic timespace, which combines stereoscopic techniques and digital special effects, opens up the sheet of Dr. Stone's traumatic past from within her present plight, hence fusing the actual passing present and the virtual preserving past indiscernibly in a stereoscopic crystal-image. The "teardrop" sequence, therefore, is an exemplary stereoscopic crystal-image that emerges from a subjective stereoscopic timespace. Here, there is a strong sense of both volumetric multiplicity and off-screen space beyond the horizontal breadth and the vertical height of the 3D field screen. The off-screen space of the deep 3D image, in this context, is charged not only with spatial potential but also with temporal potential: the virtual inhabits these images



**Figure 3.6** *Gravity* (Alfonso Cuarón, 2013) The virtual communication on radio with a man on earth pushes Dr. Ryan Stone completely into desperation and sadness. The stereoscopic long take within a medium close frame emphasises the claustrophobic atmosphere inside the capsule.

The second segment in this 10-minute long take is another stereoscopic crystal-image based on the subjective stereoscopic timespace, which depicts a subjective and imaginary reunion with Matt Kowalski, who disappeared into space earlier in the film, and is presumably now dead. Actually, when Kowalski first returns and gets into the capsule, we cannot even determine if this is actual or virtual because the transition from Dr. Stone falling asleep to the present scene is rendered very smoothly in one continuous shot. The sheet of exchange between the virtual and actual is thus invisible. However, this imaginary segment is very important for the film's thematic expression and narrative progression. Not only does Dr. Stone, in the illusionary dream, memorise the phrase "landing is launching" as the key for her later launch of the Russian spaceship, the virtual conversation with Kowalski also prompts her to reexamine the past trauma that has tormented her for a long time, so that she may finally resume her determination to survive the present calamity.

To construct this subjective stereoscopic timespace, the steadily and horizontally drifting camerawork always keeps the frame as a medium two-shot on the protagonists, which accentuates the intimate and warm atmosphere. This provides a conspicuous contrast to the suffocation and desperation in the earlier segment. Furthermore, the stereoscopic medium long take, along with the dim but warm-toned lightings and the quiet ambient sound, establishes an intimate environment in which Kowalski convinces Dr. Stone to reconsider her daughter's death and regain the will

to go home. “Your kid died. Doesn’t get any rougher than that”. It is as if Dr. Stone is convincing herself through the virtual Kowalski; in this case, Kowalski becomes Dr. Stone’s “conceptual personae”, the subjective stereoscopic timespace becomes the intermediary. As Deleuze and Guattari put it, “one does not produce something by saying it, but one produces movement by thinking it, through the intermediary of a conceptual personae” (63). In her hallucination, Dr. Stone really rethinks and reexamines her daughter’s death, through Kowalski’s reappearance, so as to better face her current difficulty. The stereoscopic medium two-shot indiscernibly coalesces the actual Dr. Stone and the virtual Kowalski as one, the past trauma and the present calamity as a whole, in this subjective stereoscopic crystal-image. Hence, “(t)here is no longer any clear distinction between actual and virtual, past and present”, “for it is an image of time in which the past can be rediscovered, reinvented, opened up and discovered anew. What this in turn means is that the future too can be opened up and subject to change” (Rushton 98-9). By reopening and rediscovering her past through her “conceptual personae” (Kowalski), Dr. Stone’s future is opened up beyond the enclosed capsule and subjected to change from within her uncertain present.

In fact, although there are two human figures in *Gravity*, there is only one character throughout: Dr. Ryan Stone. To a certain extent, Kowalski presents the hidden side of Dr. Stone’s personality. Or, we could say Kowalski is Dr. Stone’s mirrored virtual side. After the two personalities coalesce into one, incarnated in the recovered and determined Dr. Stone, Kowalski disappears from the film. Therefore, the same line: “I have a bad feeling about this mission,” uttered by Kowalski in the opening shot in a joking tone, is later repeated with a smile by Dr. Stone as she takes the Shenzhou capsule back to Earth in the climactic scene. This means that the optimistic nature embodied by Kowalski and also hidden in Dr. Stone herself finally overcomes the pessimistic side of her personality and drives her to survive.

This correlation of Dr. Stone and Kowalski is manifested in another pair of stereoscopic crystal-images. The first one is as I mentioned that Dr. Stone’s virtual image is reflected upside-down in the mirror on Kowalski’s wrist when she tells him about her daughter’s death, which is the first indication of Dr. Stone being struck deeply by this past tragedy. Her mirrored body drifting upside-down in the distance evokes a sense that she is being swallowed by her vast and deeply traumatic past. The

next 360-degree rotating close-up on her saddened expression, together with her dialogues, emphasises her painful struggle with her traumatic past and her attempt to escape it by joining the space mission. The second stereoscopic crystal-image to show the coalescence of Dr. Stone and Kowalski is in the long take when Dr. Stone looks outside from the Russian capsule window after calling Kowalski many times without any response. Her face is reflected on the window out of focus in the deep plane while the partial Earth outside is disproportionately and sharply in the front plane. Here Dr. Stone's out-of-focus reflection on the window is the virtual image of Kowalski, who is floating further and further away from her in space. Now she sees Kowalski through herself in the mirrored image, just as Kowalski had, in the earlier scene, observed her in his mirror. By correlating these two stereoscopic crystal-images, Dr. Stone and Kowalski become mirrored figures to each other as two sides of one character. When they appear in the two-shot crystal-image in the capsule sequence, that is the only time they sit side by side in the entire film. Here, Dr. Stone is an actual and present figure while Kowalski becomes a virtual and past one. This is the most symbolic image that they are two sides of one character. In summary, we see the indiscernibility of the actual and virtual, the present and past, in all these stereoscopic crystal-images based in a subjective stereoscopic timespace.

## **Conclusion**

In conclusion, stereoscopic 3D techniques can enhance our sense of movement and powerful action through intensifying directionality, distance and three-dimensional spatiality. It can also contribute to a sense of spaces as dynamic and unstable through the establishment of primary and dynamic stereoscopic timespaces, so that the theatre of action is not enclosed within the boundary of the 3D window. Therefore, it could be said that there is a strong sense of off-screen space beyond both the horizontal breadth and the vertical height of the 3D field screen. Moreover, the enhanced infinite volumetric depth suggests a general extension of actions and movement (not only those along the Z-axis). By integrating seamlessly with digital special effects (VFX), the dynamic stereoscopic timespaces can even modify the spatial relationships among the X-axis, Y-axis and Z-axis, thus enhancing and dynamising the interplay between character actions and spaces in movement. Therefore, dynamic stereoscopic timespaces tend towards instability, so that spectacular movements, actions, disasters

and wondrous transformations are produced and enhanced, as in *Need for Speed* and *Pompeii*.

However, if the temporal aspects of the stereoscopic timespaces have in some cases reasserted themselves over spatial aspects, this also allows for elements of the time-image to surface in what are basically movement-image films; in Deleuze's words, they "reverse time's subordination to movement and show time for itself" (109). Such films can, at certain moments, produce subjective stereoscopic timespaces, as exemplified by the hologram scene in *Prometheus* and Dr. Stone's virtual communication and Kowalski's reappearance in *Gravity* (2013). In most subjective stereoscopic timespaces, the spatial status tends to maintain stable, because the nature of subjective stereoscopic timespaces has fully transformed into pure temporality and the aim of them draws forth a different artistic potential – inspiring thoughts through time. At such points, we may see the indiscernible exchanges and coalescence of the virtual past (future) and actual present in *stereoscopic crystal-images*.

The three layers of stereoscopic timespaces do not have a straightly hierarchical relation to one another. In other words, subjective stereoscopic timespaces are not superior to the other two types of stereoscopic timespace. It is also worth noting that there are very few stereoscopic crystal-images (in which the relationship between actual and virtual is blurred) that surface from the substrate of subjective stereoscopic timespaces more generally in digital 3D cinema. However, hypothetically, with infinite depth and dual parallax spaces as a formal resource, the 3D mode might provide a renewed opportunity for avant-garde and experimental filmmakers, who favour fewer cuts, longer takes, and deep focus aesthetics, to work strategically with *mise-en-scène*, innovating with *stereoscopic crystal-images* and exploring the temporal continuum – "a bit of time in the pure state" (Deleuze 82). In this case, it may be that 3D, in comparison with 2D, allows new possibilities for the virtuosic rendering of crystal-images that are both intelligible and dramatically effective for mass audiences. In any case, subjective stereoscopic timespaces, as a matrix for stereoscopic crystal-images, should be instrumental for filmmakers in expressing a thought "born from an outside more distant than any external world" or "an unthinkable or unthought, deeper than any internal world" (Deleuze 278).

Meanwhile, primary and dynamic stereoscopic timespaces continue to serve as powerful tools for generating spectacle and propelling narrative. As I suggested earlier, these timespaces are articulated primarily via the positive parallax – the environments and interactions of these films therefore provide further evidence of the current dominance of the Aesthetics of Recession as way of rendering both spectacle and narrative.

## Chapter 4: Volumetric Dramaturgy: Staging Drama in Depth

I think 3D should be used in drama because it gives volume. It just picks up so much information...I think when we pick up something actually has volume, the whole rules of the game should be gradually changed...we're making an adjustment to the new illusion of cinema. (Ang Lee, "Exclusive Live Video Interview")

The aesthetics of digital stereoscopic cinema depend on making creative use of the depth effect as a means for expressing narrative, thematic, and emotional meaning and of choreographing Z-axis perspective so that it does not conflict with other image elements. (Prince, *Digital Visual Effects* 209)

In this and the next chapter, I will concentrate on narrative and narrational issues in contemporary digital stereoscopic 3D cinema. Firstly, in this chapter I will focus my attention on the dramatic organisation of onscreen bodies, objects, and spaces, showing how the use of stereoscopy contributes to what I am calling "volumetric dramaturgy". In the next chapter, I will concentrate on the relationship between subjectivity and spatiality, showing how 3D effects have been used to contrast and overlay narrative perspectives.

I will start my present discussion with the definition of *narrative* given by Edward Branigan–

*...narrative is a perceptual activity that organizes data into a special pattern which represents and explains experience.* More specifically, narrative is a way of organizing spatial and temporal data into a cause-effect chain of events with a beginning, middle, and end that embodies a judgment about the nature of the events as well as demonstrates how it is possible to know, and hence to narrate, the events. (*Narrative Comprehension* 3)<sup>17</sup>

Since stereoscopy's main contribution to cinematic narrative is the enhancement of spatial aspects, my analysis in this chapter will be concentrated on how "spatial data", particularly those along the Z-axis of volumetric stereo space, are used to produce dramatic effects. However, this concentration on "spatial data" does not mean to negate the essential contribution to narrative of "temporal data". As the previous

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<sup>17</sup> The italic sentence is in the original text.

chapter illustrates, both digital effects and 3D aesthetics contribute to the production of spatiotemporal figures and effects. Yet by focusing primarily on spatial articulation, this chapter will illustrate the ways in which staging in depth is used to generate drama and hence narrative. I will use the term *volumetric dramaturgy* to refer to the use of stereoscopic techniques to orchestrate the spatial arrangement of characters, objects and spaces, so as to render dramatic interaction and orchestrate narrative.

Volumetric dramaturgy's primary role is to enhance narration, which in Branigan's succinct definition "is the activity of giving narrative. It is a dialectical process between narrator and reader *through which* is realized a narrative" (*Point of View* 39). Here, the spatial emphasis of 3D is not simply directed towards the production of spectacle, but has a specific narrative function. Discussing the relationship between narration and space, Branigan claims that "[t]he most general problem that a viewer must confront about film narration is how to justify successive spaces and new scenes. The problem is not that we simply acquire new information but that we acquire it in a variety of ways and these ways must be justified" (61). He further asserts that the narrative process "seeks to strike a balance between the demands of three-dimensional and two-dimensional space, between character time and spectator time. This suggests that narrative in general is a function which correlates imagined space-time with perceived space-time" (*Narrative Comprehension* 62). Obviously, this assertion is in the context of 2D cinema, in which audiences encounter a three-dimensional story-world via a two-dimensional viewing medium. In stereoscopic cinema, this equation is complicated by the fact that what we see is not simply a traditional flat screen, but a 3D field screen<sup>18</sup>. How, then, do the "rules of the game" for 2D cinematic storytelling change in relation to this experience of volumetric plenitude?

Stephen Prince's following statement may shed some light on this question:

If an essential attribute of cinema is direction in depth—the tableau staging of early cinema quickly gave way to analytic editing—then stereoscopy takes this attribute to a new level. As I describe presently, 3-D shifts the existing aesthetics of editing and shot composition to accommodate the novel challenges

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<sup>18</sup> See my related discussion of this term coined by Miriam Ross in Chapter 2, and her original notion in "The 3-D Aesthetic: *Avatar* and Hyperhaptic Visuality" in *Screen* 53.4 (Winter 2012): pp. 381-97.

of choreographing the Z-axis as a storytelling device” (*Digital Visual Effects* 201-2).

These “novel challenges” help to define both the possibilities and the limits of volumetric dramaturgy. As Prince further notes, “Stereoscopic aesthetics hinge on the effective management of depth, and stereographers compose a ‘depth score’ to organize Z-axis design over time and in ways that express the style and substance of a film’s narrative” (212). How, then, do filmmakers achieve this “effective management of depth” and what dramatic effects do they create?

Indeed, the spatial interaction between bodies and objects in 3D cinema resembles neither what we perceive on a flat 2D screen, nor what we perceive in real life. In this case, the stereoscopic effect is produced by the (actual or virtual) two-camera mechanism, rather than by “natural” perception. It hence creates a uniquely hyper-realistic view, with its own distinctive potential for dramatic staging. 3D cinema’s staging thus can thus be differentiated from both traditional 2D cinema and from the spatial organisation of live theatre, although it arguably bears a little in common with both<sup>19</sup>. Director Baz Luhrmann, acknowledging the influence of Alfred Hitchcock’s 3D film *Dial M for Murder* (1953) on his adaptation of *The Great Gatsby* (2013), makes the following observation: “Some time ago I saw *Dial M for Murder*. It’s a drama in a room. There’s a bit of spectacle, but the really big special effect is five actors standing in the plaza suite doing an eight-page scene in 3D. To see them act in 3D—it’s not theatre, and it’s not what I’d known as 2D cinema. But it’s definitely something else” (Corry 6). Here, Luhrmann’s distinction between 3D and its dramatic precursors is based on implied similarities with both of them. 3D may be “something else,” but it also borrows elements from 2D cinema and theatre. As André Bazin notes, “...the relations between theater and cinema are much older and closer than is generally thought to be the case...they are certainly not limited to what is generally and deprecatingly called ‘filmed theater’” (1: 81).

The term “filmed-theater” refers to films of direct adaptation from theatrical works, such as *Henry V* (Laurence Olivier, 1944), *Hamlet* (Laurence Olivier, 1948), *Les Parents terribles* (Jean Cocteau, 1948) and *Rope* (Alfred Hitchcock, 1948). Bazin used these films as examples to stress the enduring and intimate relationship between

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<sup>19</sup> See Scott Higgins’s elaborate discussion of *Coraline* (2009). “3D in Depth: Coraline, Hugo, and a Sustainable Aesthetic” *Film History* 24.2 (2012): pp. 196-209.

theatre and cinema: “if we insist that the dramatic is exclusive to theater, we must concede its influence and also that the cinema is the least likely of the arts to escape this influence” (1: 81-2). He further differentiates the two artistic forms: “We may say in fact, adapting Henri Couhier’s formula, ‘the stage welcomes every illusion except the illusion of presence,’ that ‘the cinematographic image can be emptied of all reality save one—the reality of space’” (1: 108). Despite the nuanced difference between theatre’s “reality of presence” and cinema’s “reality of space”, he asserts that cinema’s “increase in the space factor reestablishes the equilibrium of the psychological equation” (1: 98). In other words, this “psychological equation”, which is re-established by the cinematic insistence on space and comparable to the effect of theatrical presence, provides a large variety of domains for cinematic dramatisation. If the dramatic effect in theatre relies on the “reality of presence”, drama in cinema is transformed by the increased “reality of space”.

Other writers, in focusing on the way that 3D cinema can produce a heightened spatial awareness in audiences, have also pointed towards this overlap between cinema and theatre. Sheldon Hall’s description of *Dial M for Murder* seems to imply a relation between film and audience that is almost theatrical in its spatial aspect:

Obvious, gimmicky visual effects for show or shock value are rigorously avoided; yet there is considerable use of multi-plane space for composition in depth. In particular, the placement of objects or furniture in the immediate foreground obtrusively calls attention to the space around and between the actors, and between the actors and the camera. Such obtrusiveness...has the effect of emphasising the space of the action itself, and certain details of the *mise-en-scène* which do, occasionally, protrude from the screen. Ultimately, it introduces an imaginative distance from all the film's characters in favour of an awareness of the plot, and the whole film, as a mechanism for the production of suspense. (Hall 246)

The resulting “imaginative distance” invited by Hitchcock’s “considerable use of multi-plane space for composition in depth” encourages the audience to pay attention to the plot progression and dramatic interactions among characters without identification with any of them. Hitchcock’s cinematic adaptation of Frederick Knott’s original stage play highlights common elements shared by theatre and 3D cinema, in

particular via its emphasis on mise-en-scene and staging in depth; at the same time, it substantiates Bazin's comment on the successful filmed-theater genre films: "It is a conquest of realism—not, certainly, the realism of subject matter or realism of expression but that realism of space without which moving pictures do not constitute cinema" (Bazin 1: 112). This comment resonates with Ang Lee's remark, nearly sixty years later, that "I think 3D should be used in drama because it gives volume" ("Exclusive Live Video Interview"). Here, obviously, Lee is referring to drama in its broader sense, rather than directly to theatre. Nonetheless, his comment suggests a connection with the "dramatic presence" that is a feature of theatrical staging. Such comments also align with Scott Higgins's claim that a "depth-oriented" aesthetic is a sustainable aesthetic for digital 3D cinema because it allows space for dramatic action and interaction. Analysing Henry Selick's *Coraline* (2009) and Martin Scorsese's *Hugo* (2011), Higgins writes: "3D remains caught between novelty and norm, but *Hugo* and *Coraline* help define a depth-oriented aesthetic that can bind stereoscopic effects to character-oriented narrative tasks; the approach checks and controls protrusion while seeking expressive methods for handling the space behind the screen" (207). These "character-oriented" stereoscopic effects render onscreen environments as spaces of narrative action, and thus as staging grounds for what I am calling *volumetric dramaturgy*.

How, then, do filmmakers use *volumetric dramaturgy* to engender dramatic effects? Clearly, mise-en-scène is central to *volumetric dramaturgy*, in spite of 3D's cinematographic basis. As David Bordwell and Kristin Thompson put it, "(s)tereopsis is a depth cue rendered by cinematography rather than mise-en-scene, although it does demand arranging the scene in depth" (*Film Art* 148). Here, I want to emphasise the act of "arranging in depth" and its potential to produce dramatic effects. As Miriam Ross suggests, stereoscopic cinema opens up the potential of mise-en-scène via the qualities of the "3D field screen":

When watching 2-D film we make choices about how to view the visual field that is presented to us (by focusing on one area of the screen or reading it from side to side). The 3-D field screen increases these options as it frequently presents the possibility of interacting with continuously multiplying depth planes...This interaction with the field screen is complicated by the awareness that the stereoscopic perceptive process is not the same as the practice of

looking in our everyday visual world. Instead it recalls the potential offered by deep focus to explore the space created by the mise-en-scène”. (“The 3-D Aesthetic” 395)

Ang Lee’s following remark also substantiates the priority of mise-en-scène over montage in 3D cinema from a more practical perspective:

Usually when we make 2D movies...in many ways montage probably is more effective than mise-en-scène. But in 3D I suspect mise-en-scène has the upper-hand over montage. Your eyes adjust to cutting to the Z-axis much slower than left-right and up-down. In the meantime, with mise-en-scène, because you have real volume, you pick up so much more. (“Exclusive Live Video Interview”)

The orchestration of dramatic space in 3D cinema can be seen in the relationship between the positive and negative parallax. In the context of *volumetric dramaturgy*, these might perhaps be equated with theatre’s spatial coordinates of “upstage” and “downstage.” Prince argues: “An effective depth score is budget-driven<sup>20</sup>, orchestrating negative and positive parallax across the narrative arc of the film in ways that creatively engage (and don’t exhaust) the viewer’s attention and image-fusion capabilities and that also embody important attributes of narrative and dramatic meaning” (*Digital Visual Effects* 214). In addition, owing to digital technology’s integration into contemporary 3D cinema, especially via digital special effects (VFX) and computer-generated imagery (CGI), 3D cinema has increased its capacity for “**deep-space** composition” (Bordwell and Thompson, *Film Art* 148) to an unprecedented level. This has allowed filmmakers to explore the potential for dramatic spatial effects. “By making stereographic cinema viable, digital modes have encouraged filmmakers to strive for composition in depth as an alternative to the shallow-focus filming and fast cutting that predominates in contemporary planar cinema. By privileging deep focus, stereoscopic cinema necessarily emphasizes longer shot durations” (Prince, *Digital Visual Effects* 214). This emphasis allows filmmakers to “choreograph the Z-axis,” but also produces a fundamental

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<sup>20</sup> Depth Budget: This is the amount of “stereo” or 3D that is set prior to filming for the 3D department to adhere to; typically it is talked of as a percentage. <http://www.3dfocus.co.uk/3d-glossary>. Accessed 24 August 2014. Depth budget nowadays can also be modified or determined during the post-production process.

transformation in many conventional cinematic devices familiar from 2D cinema, such as close-up and shot/reverse shot.

In summary, I will investigate the use of dramatic staging along the Z-axis (through positioning, blocking and movement of performers/objects), alongside shot selection and composition. My discussion will begin with characters' spatial positioning and movement (in close-ups), then move to characters' spatial relation to one another, followed by the organisation of digitalised characters/objects, before concluding with the dramatic organisation of settings (spatial environments). All of these strategies of spatial organisation produce the *volumetric dramaturgy* of the contemporary digital 3D cinema, which aligns with and constitutes an organic component of the emergent "Aesthetics of Recession".

### **Facial Close-up in Negative Parallax Space: Thematic Expression and Characterisation**

Compared with a two-dimensional painting canvas, a three-dimensional oval sphere with imbalanced positive and negative volumes across the transparent 3D window offers not only more scalability in terms of volume but also infinite depth in the positive parallax space along the Z-axis. On the other hand, this unbalanced volumetric trait of stereoscopic space makes its representational world much more vulnerable to technical errors or malfunctions. Prince addresses a series of technical problems in 3D filmmaking such as window violations, excessive IoD and convergence settings, rack focus and shallow focus compositions (*Digital Visual Effects* 208-210). Herbert Zettl lists more wrongdoings in 3D productions relative to framing a shot, over-the-shoulder shots, close-ups and extreme close-ups, depth of field, camera movement, editing and mishandling soundtracks (155-157). However, he bluntly points out the real problem for 3D is "not just technical or physiological...but primarily psychological and aesthetic issues". Using the example of the close-up, he states: "Even the same close-up may have a completely opposite psychological effect when shown in 3D instead of 2D" (157). Messaris's explanation that we are unaware of close-up as a regulator of intimacy and involvement in 2D media due to such visual manipulations being simple extensions of our real life perceptual habits is not applicable to the 3D viewing experience (157). In 3D, even a close-up deployed in the positive parallax still reveals a certain degree of intrusiveness, thus may be more suited to depicting conflict rather than intimacy. A

close-up located in the negative parallax that overlaps the audience space may function in the opposite way to the indication of intimacy often provided by a 2D close-up. However, innovative 3D filmmakers can cunningly use this 3D “artefact” to generate dramatic effects for narrative purposes by intentionally making the audiences feel “annoyed” or confronted, so as to drive them to think more about character and thematic issues.

One of the essential contributions of Ang Lee’s adoption of 3D techniques in *Life of Pi* is his use of cross-parallax strategies to serve both narrative and spectacle. This balanced strategy allows him to avoid excessive exploitation of the “protrusion effect” without completely abandoning cross-parallax effects, so that he does not confine himself solely to the positive parallax space. However, when “choreographing the Z-axis” within the tighter space of the negative parallax, Lee takes a cautious approach, controlling the “bulge” and using it to contribute to dramatic staging. As an example, I will use the climactic scene of Pi retelling his revised survival story, in which Lee utilises the “dynamic floating window” technique<sup>21</sup> to shape cinematic space. In this new version of Pi’s adventure completely iterated by his verbal monologue, due to the two insurers’ requirement, Pi retells his survival story simply without the companion of the Bengal Tiger – Richard Parker.

In this scene, Pi’s prolonged monologue is shown in a dramatically arresting zoom-in, which starts as a medium long shot of Pi sitting on the sickbed in the positive parallax space. After intercutting with a couple of reaction shots of the two Japanese insurers, it slowly zooms into a close-up of Pi, which crosses the 3D window and relocates in the negative parallax. The “dynamic floating window” (DFW) technique, developed by Lee’s stereographer Brian Gardner, facilitates this cross-parallax effect by floating the 3D window backward so slowly as to be almost imperceptible. As a result, Pi’s close-up emerges in the negative parallax after the zoom completes while he continues telling the second version of his survival story (leaving out the apparently fantastical tiger), at the request of the two insurers. Describing the functionality of DFW, Gardner states that:

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<sup>21</sup> For technical details of the “dynamic floating window” technique, please view Bernard Mendiburu’s presentation “The Dynamic Floating Window: a new creative tool for 3D movies by Brian Gardner” during 2011 Stereoscopic Displays and Applications XXII: [http://www.youtube.com/watch?v=TucS4c\\_W9Sk](http://www.youtube.com/watch?v=TucS4c_W9Sk). (Accessed 20 August 2013). For Brian Gardner’s original text, please see “Dynamic floating window: new creative tool for three-dimensional movies” in *Journal of Electronic Imaging* 21(1), 011009 (Jan–Mar 2012). Downloaded from: <http://electronicimaging.spiedigitallibrary.org/>. Accessed 25 June 2014.

The stereo window has inherent visual meaning. By dynamically controlling the stereo window, we can manipulate the perception and emotional intensity of a story's moments: its story beats. To make a moment feel "safer," we can position the DFW in front of the other elements. Alternatively, characters and objects on the audience's side of the stereo window can often have a stronger emotional impact on the audience. ("Dynamic floating window")

According to Gardner, other than eliminating technical artefacts caused by "window violation" in 3D, DFW can usually "increase the sense of impending danger in a scene" by "placing the threat into the audience's space" ("Dynamic floating window"). The implications of this effect are not only experiential (producing spectacle) but also dramatic (configuring bodies to further narrative goals). The emergence of this close-up into the negative parallax might make the audience either visually annoyed or heighten our empathy for Pi, literally foregrounding the actor's absorbing performance – he is trying hard to make the insurers (and audience) believe the story he is telling. However, in either case the audience is made to feel aware of the technique itself, and its potential for psychological manipulation. This technique therefore undermines the truth-effect of Pi's revised story, making it seem less convincing than the earlier, more fantastical account (especially since the middle-aged Pi's earlier story is mostly recounted through compelling visuals and his calm storytelling pattern). Consequently, the audience can make her/his own conclusion on which version is "the better story" and easily side with the writer/listener's answer when Pi asks him to pick one version over the other – "the one with the tiger". Pi's response to the writer is "Then you are following God." Here, the film's theme is neatly underlined: to make people truly believe in a religion, one must have a compelling story. This message is further emphasised by both the two insurers' sceptical reaction to Pi's second version of the story and the ship company's final report (read by the writer), which also adopts Pi's first version incorporating the tiger.

Here, 3D 'staging' produces a distinctive dramatic effect, as the close-up of Pi emerging into the negative parallax enhances the audience's sense of discomfort and suspicion in response to Pi's exaggeratedly emotional revision of his story. As Gardner concludes: "The DFW invention has introduced and opened up a new semantic element in the new spatial grammar of movies, which had previously not existed in any form, adding three-dimensional manipulation of a controllable,

directable, articulated stereo window to the spatial language of movies” (“Dynamic floating window”). Here, this 3D technique applied to the close-up creates a conspicuous contrast between Pi as a younger and an older man (in later shots) via the spatially accentuated close examination of his face, his temper and mind, and further underlines the film’s thematic exploration of questions of faith and belief. Using the dramatic convention of the monologue, the film places it within a ‘staged’ space, adding to its narrative and thematic resonance.



**Figure 4.1** *Life of Pi* (Ang Lee, 2012) A long take from an over-shoulder medium shot of Pi on the sickbed zooms into his facial close-up while Pi retells his survival story, in a version without the tiger, to the two Japanese insurers. His figure is stealthily shifted from the positive parallax space (behind the 3D window) into the negative parallax space by using the so-called “dynamic floating window” technique in the climactic scene.

In the post-processed 3D movie *Star Trek: Into Darkness* (2013), director J. J. Abrams also uses the technique of facial close-up in the negative parallax to characterise the main antagonist, the genetically engineered superhuman Khan, when he tells the USS *Enterprise* crew the story about his 72 crewmembers being killed 300 years earlier. For his exaggeratedly emotional monologue, during which tears run down both of his cheeks, Khan’s facial close-up intrudes slightly into the negative parallax. The shot takes the form of a long take (although Abrams, unlike Lee, does not make use of the ‘DFW’ device in order to produce a cross-parallax movement). However, the resulting effect is similar: the negative parallax close-up appears intrusive and confronting, and distances us from Khan as well as creating suspicion

around his words (a suspicion shared by the crewmembers of the USS *Enterprise* in this scene).



**Figure 4.2** *Star Trek: Into Darkness* (J. J. Abrams, 2013) A close-up of the superhuman Khan, deployed in the negative parallax in front of the 3D window, as he is delivering a fake story about his 72 crewmembers frozen on USS *Enterprise* during an exaggeratedly emotional monologue.

Although by this point in the film Khan has not been revealed as the main villain, this long take close-up of him in the negative parallax, along with Benedict Cumberbatch's exaggerated performance, implies his character's antagonistic nature by intentionally situating him along the Z-axis so that he "invades" the audience's viewing space. Later in the film, we will discover that Khan's account of events is completely fabricated: his real aim in getting aboard the USS *Enterprise* is to awaken his 72 crewmembers and then take revenge on human beings. By deliberately exploiting the "intrusiveness" of stereoscopic spatiality to introduce Khan, this negative parallax close-up gestures toward Khan's concealed villainous nature, but also produces a "faked" emotional moment, hence foreshadowing the future dramatic confrontations between him and the crew of the *Enterprise*. In 3D cinema, negative parallax close-ups, whether during a conversation or an individual monologue, may thus be used to amplify the threat posed by a "bad guy" or a mentally twisted character.

In recent years, filmmakers have begun to make increasing use of stylistic devices associated with 2D cinema, but typically avoided in 3D. For instance, over-

the-shoulder shots and shot/reverse shots have both been long regarded as “taboos” in 3D filmmaking; however, more and more 3D works produced in recent years have ignored these prohibitions, integrating these devices into a stereoscopic context. The negative parallax close-up of Pi, for example, actually follows a conversation between Pi and the two Japanese insurers presented using over-the-shoulder and reverse shots. In the next section, I will use another example from *Star Trek: Into Darkness* to analyse the dramatic enhancement provided by the deployment of an over-the-shoulder/reverse shot structure in 3D.

### **Stereoscopic Shot/Reverse Shot: Staging “Obstructions” for Dramatic Tension**

The magnified and accentuated spatial relationship between characters can be used to increase dramatic intensity – for example, by magnifying the volumetric scale of conflicts between characters via the over-the-shoulder shot/reverse shot tactic. In the 3D sci-fi adventure *Star Trek: Into Darkness* (2013), a normal conversation scene between Admiral Christopher Pike and Captain James Kirk in the former’s office generates dramatic conflict between the pair, presenting a confrontation between two strong military characters through the deployment of a starkly obtrusive over-the-shoulder shot/reverse shot structure.

The scene follows a dispute in the same locale involving three characters: Admiral Pike, Captain Kirk, and Mr. Spock. After Spock is dismissed by Admiral Pike, the re-establishing shot shows Admiral Pike walking around his desk and approaching Captain Kirk while accusing the latter of breaking the rules during the last outer-space mission. Then a drastic, head-to-head argument is staged in a series of shot/reverse shots, showing the characters in close-ups over each other’s shoulder. I would argue that the amplified spatial distance between the two characters, combined with the stark volumetric obstruction of each other’s shoulder in the foreground, intensifies the dramatic conflict. In 2D, this well-scripted, dialogue-based dramatic scene would still be a theatrically engaging confrontation between two egotistical military characters; however, the magnification of visual obstacles and spatial distance between the characters underlines the dramatic staging of this confrontation, and establishes the characters, Admiral Pike and Captain Kirk, as staunch and stubborn personalities.

This scene substantiates Zettl’s argument regarding close-up’s fundamentally different functionality in 2D and 3D media, in which close-up is seen more as a

regulator of intimacy and involvement in the former while tending to incite dramatic confrontation and conflict in the later (157). In 3D cinema, if close-ups are framed in an over-the-shoulder/reverse shot pattern (a commonly employed strategy for conversation scenes), they tend to reinforce the friction between the characters and further bring up the intensity of the dramatic conflict. Although *Star Trek: Into Darkness* is a post-processed 3D movie, it still provides an excellent example of these stereoscopic effects and techniques. As Miriam Ross observes, “Often post-production [3D] conversions are able to control similarity (particularly colour and alignment) between images more effectively than native [3D] productions” (“Miriam Ross Research Provocation”).

In the dramatically intense climactic scene of *The Great Gatsby* (2013), the stereoscopic over-shoulder shot/reverse shot arrangements draw out the complicated interaction and nuanced relation changes among five characters: Jay Gatsby, Daisy Buchanan, Tom Buchanan, Nick Caraway and Jordan Baker. The scene takes place in a fancy plaza room in New York City, in which the five characters are distributed at different points around the room. Gatsby and Tom, the rival for Daisy’s love, are in the centre of the conflict; Nick and Jordan are the main witnesses of this triangular relationship. Having tried hard to rein in his temper over Tom’s disclosure of the illegal businesses that have earned him dirty money for throwing lavish parties, Gatsby suddenly storms at Tom from behind and presses him down violently against the bar. The drama peaks as their spatial relationship reaches the closest point: a nose to nose standoff lasting several seconds, framed in a two-shot. Then Gatsby releases Tom’s collar and leaves him alone while murmuring repeatedly, “Sorry, I lost my temper...” before walking towards Daisy. I will discuss this scene in terms of the use of shot/reverse shot in concert with the two-shot, showing how it produces an accumulation of dramatic tension.



**Figure 4.3** *The Great Gatsby* (Baz Luhrmann, 2013). In the climactic scene, the spatial relations between Gatsby and Tom change the psychological distances between them and eventually produce the most drastic and powerful dramatic climax for the entire film. The stereoscopic shot/reverse shot deployment for the climax face-off of the duo enhances the dramatic tension and confrontation.

In this nearly ten-minute climactic scene, the stereoscopic staging of depth is integrated with traditional aspects of *mise-en-scène* to build dramatic tension and establish the narrative apex of the film. In particular, the stereoscopic articulation of dramatic staging is consistent with Baz Luhrann’s suggestion that 3D cinema offers “something else” when compared with both theatre and 2D – but also with the implication that it borrows something from both. Here, the staging of depth along the Z-axis produces a theatrical dimension, highlighting cinema’s commonalities with stage drama.

There is no “protrusion effect” shot deployed in the negative parallax space at all during this scene, even for the most confrontational moment when Gatsby storms angrily up to Tom. The spatial relations between Gatsby and Tom change the psychological distances between them and underline the dramatic conflict. It is worth noting that it is not until the tension between Gatsby and Tom has built towards its breaking point (when Tom walks away from the bar where Gatsby still stands, trying hard to control himself), that the camerawork shifts to the over-the-shoulder/reverse shot pattern, thus immediately accentuating the increasing friction between the duo. When Gatsby pushes Tom against the bar and shouts at him hysterically “Shut up! Shut up! Shut up!”, the dramatic conflict is enhanced by the visual obstacle of the

rival's shoulder in the foreground plane. Moreover, their physical positions during this shot/reverse shot sequence suggest a power imbalance, with Gatsby positioned above Tom. This physical imbalance, along with the stereoscopically-emphasised visual obstruction in the foreground, underlines the intense confrontation between the two rival characters.

The film maintains this tension by cutting to a two-shot of the duo staring at each other, head to head, at an extremely close distance – with neither of them speaking. The distance between the audience and both characters - amplified by stereoscopic depth - makes it difficult to identify with either of the characters, producing a sense of psychological distance and encouraging a detached perspective on the dramatic confrontation and the advancement of the plot. As a result, the series of over-shoulder/reverse shots between Gatsby and Tom, in tandem with the following two-shot that includes them in one frame, not only highlights the intense conflict between the duo as rivals for love, but also delineates the irreconcilable collision between “old money” (Tom) and “new money” (Gatsby) in early 20<sup>th</sup> century in America. This orchestration of *volumetric dramaturgy* takes place primarily in the positive parallax, thus exemplifying the “Aesthetics of Recession.” In this context, the Aesthetics of Recession are used to articulate and make legible both dramatic and historical conflicts.

### **Fewer Shots and Fewer Cuts: An Economic Aesthetic for Maximising 3D Theatricality**

In Chapter 2, I discussed 3D's capacity for rendering objects' volume, by comparing the “storm revelation” scene in the 3D version of *Life of Pi* with the climactic “storm attack” scene in the 2D film *The Perfect Storm*. The volumetric abundance of the stereoscopic illusion can be used either to increase or decrease the size of the visual objects based on the different depth planes in which they are deployed. Strategically arranging objects to emphasise volume can thus cause certain objects to “swell up” in size while others “shrink.” More importantly, by choreographing the interaction of characters/objects located in multiple depth planes (including live action character(s) and digitally CGed characters/objects), filmmakers can maximise 3D's distinctive stereoscopic theatricality, thereby driving narrative forward and generating thematic meanings. In this section, I will use the “shipwreck” scene in *Life of Pi* (2012) and the climactic scene in *World War Z* (2013) to illustrate the effectiveness of volumetric

dramaturgy through my analysis of the spatial interplay of live action performers in relation to CGed characters/objects staged in depth along the Z-axis.

By synthesising into one image the CGI-generated waves and foundering ship with Pi's live-action turning movement, the filmmakers emphasise the dramatic interaction between the three characters – Pi, the foundering ship and the waves – as well as other onscreen objects deployed in multiple depth planes. This helps to represent a traumatic moment in Pi's life as well as demonstrate the almighty power of God<sup>22</sup>. Ang Lee remarks that the volumetric richness of 3D allowed him to complete this particular shot economically by arranging Pi “in the audience space,” looking back at the wreck of the ship in the positive parallax space – a scene which, according to Lee, would have required three shots in 2D:

I put Pi in the audience space, way outside the screen; so you're looking over his shoulder. I think that's how we imagine ourselves doing things. Because Pi is in your space, you're looking at the same thing he is looking at. Therefore, the POV becomes over-shoulder (shot). You're envisioning yourself doing it. I don't think you can get that in 2D. If I was to do that shot in 2D, I would need three shots: the same establishing shot, then I would cut to the ship as Pi's POV and then I'll turn around to have a close shot of Pi's face for his reaction. That's how I would do it in 2D. But in 3D, you're there and experiencing it. I think that's quite an advantage. (“Exclusive Live Video Interview”)

This “three-in-one” shot, which also functions as a dynamic stereoscopic timespace<sup>23</sup>, reveals fundamental differences between 3D and 2D visual storytelling, and appears to illustrate Lee's remark that “mise-en-scène has much more of an upper hand over montage in 3D”. Filmed in deep focus, this scene shows Pi “way outside” in the

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<sup>22</sup> In a live interview from New York City to London during the *3D Creative Summit* in London, UK, on March 27<sup>th</sup>, 2013, Ang Lee recalled the production deployment of the shipwreck scene in detail: “...the (shipwreck) sequence you were just seeing, if it was in 2D, I think I would need 200 feet of waves to impress everybody and that sequence is about to know the power of God. You have to be in awe, to be impressed...I think we have no more than 30 feet of waves. If it's 2D, I don't know how to put it off that effectively” (Lee 2013). In the same summit, David Conley, the VFX supervisor for *Life of Pi* disclosed how Lee insistently demanded that the visual special effects team increase the size of the storm and the height of the waves augmented by CGI work. Conley jokingly asserts that 3D mode actually helped his team achieve Lee's “mission impossible”. See Ang Lee Exclusive Interview by Wendy Mitchell (Screen International). London, UK: March 27<sup>th</sup> 2013. “Exclusive Live Video Interview with Ang Lee about 3D in the *Life of Pi*@ 3DCS 2013.” Online video clip. YouTube, 23 April 2013. Web. Accessed [9 August 2013](#).

<sup>23</sup> See my discussion of dynamic stereoscopic timespace in Chapter 3.

negative parallax, while the sinking ship is placed deep in the positive parallax; an enlarged wave of seawater serves as a huge obstruction that prevents Pi from reuniting with his family on the foundering ship. This is a quintessential example of what Miriam Ross refers to as “the possibility of interacting with continuously multiplying depth planes” through the 3D field screen (“The 3-D Aesthetic” 395). The choreographed staging of depth along the Z-axis indicates that Pi can do nothing but helplessly watch his family-members drown in the ship, thus accentuating the sense that this traumatic moment will completely change his fate. Lee thus stages a dramatic interaction among Pi, the obstructive seawater, and the sinking ship placing Pi’s traumatised facial expression, the cause of his trauma, and the obstacle preventing him from intervening together in one single shot. This volumetrically enhanced multiple-depth staging conveys an array of narrative data, thereby providing multiple options for audience focus.

An aesthetic strategy depending heavily on *mise-en-scène* is often associated with the use of the long take. In this context, the use of deep focus helps to make legible the choreographing of objects and bodies along the Z-axis in 3D cinema. As William Brown notes, “...too often filmmakers apply the ‘intensified continuity’ aesthetic that is so successful for 2D cinema to a 3D cinema to which it is not suited. In favouring the long take, 3D cinema is instead a cinema that works well, or which is best suited to, a slower rhythm of cutting” (“William Brown Research Provocation”). Brown’s insightful statement is substantially proven by Mark Foster’s 3D *Zombie Epic World War Z* (2013), which substantiates the benefits of deep focus long takes, while also providing its own antithetical examples.

*World War Z*’s climactic scene is noticeably different from conventional dramatic action scenes, which often incorporate a fast cutting rate, hand-held camerawork, and other hallmarks of what David Bordwell calls “intensified continuity” (*The Way Hollywood Tells*). While this conventional strategy normally works well in 2D films, it produces problems when translated to 3D (sometimes generating disorientation and dizziness in audience members). In *World War Z*, the scene that produces the highest dramatic tension and emotional climax is configured as a sequence of only four long takes. This scene takes place in the sky-bridge that links A Wing and B Wing of the UN Research Centre. Avoiding the fast-cutting action and violence of earlier scenes in this film, this scene “choreographs” Gerry (Brad Pitt) walking peacefully along a long corridor, as a number of zombies run

forward but ultimately ignore him (because he has injected himself with antibodies). The scene works by emphasising the confrontational movements of Gerry and the zombies along the Z-axis, using dramatic staging and mise-en-scène to highlight the climactic revelation – no fight at all. The dramatic tension is maintained not through rapid cutting but through depth-oriented staging.

The location for this scene (the sky-bridge) is, although not expansive, long enough for the filmmakers to take advantage of the volumetric plenitude and stage depth in the positive parallax by exploring the interaction between the sole protagonist and the mass of antagonistic zombies arranged across multiple depth planes. A simple shot/reverse shot strategy is firstly applied to show that Gerry walks calmly along the corridor as the zombies approach; the third shot resumes the previous angle showing that the zombies pass by him in the middle of the corridor and completely overlook him. The last shot shifts back to Gerry's perspective and becomes his POV, so that we see from his subjective perspective the opened gate of A Wing get closer and closer and the group of scientists welcoming his victorious return. There are also couple of interspersed shots from inside a monitor room showing the group of scientists cheering Gerry on. All the four long shots in the corridor demonstrate deep focus, emphasising the spatial distance and interaction along the Z-axis between Gerry and the running zombies. Gerry and the CGed zombies move towards each other across multiple depth planes, thereby increasing the suspenseful tension as they approach each other. The contrast in tempo between Gerry's calm walking and the zombies' ferocious charging further amplifies this tension. The depth-oriented arrangement of mise-en-scène, in concert with longer shot durations and deep focus composition, together build up the dramatic tension and haunting atmosphere and eventually propel both Gerry's character arc and the main narrative arc to their shared climactic moment. Throughout the entire scene, there is no fight, no action, no blood, no gunshot, and no explosion at all, with fewer cuts, fewer shots, fewer camera movements, and a lack of spectacular effects. This visual and narrative style, which is based on 3D's economic effectiveness of staging drama in depth, contrasts with the more conventional approach seen both elsewhere in the film and in the climactic scenes of many contemporary Hollywood blockbusters.

The use of this theatrical effect to “choreograph” interactions between characters and CGed objects/characters along the Z-axis produces enhanced dramatic significance when *World War Z* is viewed in 3D. The term “*volumetric dramaturgy*”

can thus be applied not only to the staging of human interactions in a confined theatrical setting, but also to the arrangement of bodies in cinematic spaces for dramatic effect.

### **Staging in Virtual Environments: “Dramatic Opaqueness” and Stereoscopic Hyperrealism**

If the previous section is focused on a typical dramatic choreography case inside a climactic scene, in this section, I will analyse how *volumetric dramaturgy* has been used, alongside digital visual special effects (VFX), to orchestrate narrative spaces across *several* scenes, while establishing and accumulating dramatic tension. With the ubiquitous application of CGI and VFX, actors and actresses can perform live against a blue or green screen, or in front of a previsualisation (so that the performer can even see in what kind of environment she/he is performing). As a result, more dramatic interactions and effects between performers and CGed environments become possible. On the one hand, this approach gives performers tremendous freedom to act as continuously as possible, as on a stage; on the other hand, it offers filmmakers substantial flexibility and control, allowing them to produce strikingly dramatic effects through the hyper-realistic transformation of spatial environments and orchestration of performances.

Writing about the challenge of making “filmed theater”, Bazin notes, “The problem then that faces the filmmaker is to give his décor a dramatic opaqueness while at the same time reflecting its natural realism. Once this paradox of space has been dealt with, the director, so far from hesitating to bring theatrical conventions and faithfulness to the text to the screen will find himself now, on the contrary, completely free to rely on them” (1: 111). That is, the spatial environment must act as an absolute perimeter, an “opaque” backdrop for the staged actions, but must also possess its own sense of the “real.” Of course, Bazin’s sense of realism is very far removed from that of spectacle cinema, and yet the phenomenon of the green-screen sequence provides interesting parallels. If filmmakers of the “filmed theater” works in Bazin’s time used their brushes to draw on scenery boards and built up sets to produce “dramatic opaqueness” alongside “natural realism”, filmmakers nowadays can pinpoint and “pipeline” all these sets in 3D, using “digital brushes” to seamlessly composite them with live-action performers. The result is certainly not “realism” in the Bazinian sense, but rather a kind of “hyper-realism”. Filmmakers can use

artificially-constituted hyper-realistic spaces to stage striking dramas in a kind of “live theatre”. However, this stereoscopic “live theatre” is neither like a traditional theatrical space, which is an enclosed box, nor like a 2D cinematic space, which is an enframed canvas. It is more like a boundless open stage with limitless depth, which becomes the ground for dramatically heightened interactions and staging. I will use a digitally-manipulated long-take spanning several “scenes” in the final battle sequence in *300: Rise of an Empire* (2014, Noam Murro) to discuss how 3D décor and VFX can generate both “dramatic opaqueness” and hyper-realistic narrative.

The long-take runs for about two minutes during the climactic sequence, the Battle of Salamis, which pits the Persian army commanded by Artemisia (Eva Green) against the Greek forces led by Themistocles (Sullivan Stapleton). After the remaining Greek ships charge into the Persian fleet, the two sides begin to fight on the ships. The sequence ends in a stalemate, with Themistocles and Artemisia both receiving severe injuries, before Gorgo arrives at the battle along with ships from Sparta and numerous other Greek city states. During this long-take, Themistocles rides a horse while fighting numbers of Persian soldiers, charges across two battleships, plunges into the water, jumps on board one of Artemisia’s Persian ships, kills all of her guards, and finally faces off with her. Although Themistocles’s actions remain unbroken, the CG-constructed backgrounds (locations) are dramatically orchestrated and seamlessly stitched together. As a result, the hyper-realistic continuity of his actions and movement is set against the “dramatic opaqueness” of various backdrops. Themistocles’s depth-oriented choreographed movement takes place within a context of ever-changing environments arranged across different spatial strata within the image. Thus, the actor’s performance remains continuously “on stage”, while the scenic backdrops keep changing constantly. The fluid manipulation of these spatial environments and *mise-en-scène* in depth gradually accumulates atmospheric tension between Themistocles and Artemisia before their final face-off.

Although Themistocles and Artemisia have not met face-to-face yet during this long-take, two dramatic moments build up the conflict between them. Although both of them are Greek, they are now enemies, serving rival states. A quick zoom-in on Artemisia’s face, following a turn of Themistocles’s head, establishes a dramatic connection between them, reminding us of their previous encounters and focusing on her as Themistocles’s final target. Departing from this POV perspective, the camera

then zooms out from Artemisia's face and, in a long shot, encompasses Themistocles's movement as he charges into the depth, thus shifting the perspective back to third-person. The manipulation of space and depth within this zoom-in and zoom-out process re-establishes the dramatic tension between the two main characters. Sandwiched between bursts of brutal fighting and extreme slow-motion movements, the exchange of looks between these characters serves to organise the virtual "stage" of this digital environment as a space of dramatic interaction.

Another dramatic episode takes place as Themistocles charges into the water on his horse, moves underwater, and finally jumps out onto the Persian ship. This episode is extended via extreme slow motion, as the virtual *mise-en-scène* seamlessly stitches together three spaces – the broken Greek battleship, the water, and the Persian ship – making them into a unified backdrop for Themistocles's unbroken actions. This dramatic orchestration of space not only accentuates the extreme agility of Themistocles's physical movement, but also produces a kind of synthetic environment defined by its "dramatic opaqueness". Here, the hyperrealism of Themistocles's outlandish feats is supported by the hyper-realistic depth of the 3D digital imagery, oriented along Z-axis. The deep staging of performers' actions and CGed backdrops thus folds together spaces and movements to produce dramatic tensions and confrontations.

Finally, the arrangement of live-action performance and digital *mise-en-scène* in this long-take also allows for the visual perspective to oscillate between third-person objective and first-person subjective constantly, generating more dramatic effects for the audience. For example, as I mentioned earlier, the subjective close-up of Artemisia (from Themistocles's POV) pulls out to be a third-person perspective focusing again on his physical battle. After Themistocles jumps out of the water and onto the Persian ship, there are two more examples of perspective oscillation during this long-take sequence. These oscillations of narrative perspective accentuate the dramatic tension between the two rival characters, allowing the audience to observe one's facial expression or bodily action from the other's perspective. It also adds a degree of additional intensity by moving rapidly between subjective and objective modes. In the following chapter, I will discuss the issue of stereoscopic narrative perspectives in more depth.

### ***Gravity: 3D Dramaturgy and Narrative Minimalism***

*Volumetric dramaturgy*, in which dramatic staging becomes the key aesthetic consideration, can also be observed in less overtly “theatrical” contexts. Alfonso Cuarón’s *Gravity* (2013), by arranging its action against the backdrop of deep space and working with a limited set of narrative elements, can also be seen as an example of volumetric dramaturgy. The opening scene, a 13-minute long take, starts with a slowly panning extreme long shot to show infinite outer space, in which the rotating Earth takes two thirds of the screen space in the faraway depth planes while leaving the other third in darkness. The space shuttle Explorer barely appears as a tiny spot from the darkness and gradually moves forward towards the audience. Along with the advancing Explorer, Mat Kowalski (George Clooney), the experienced astronaut, spacewalks towards the audience as well. While he travels around Explorer a couple of times, the slowly moving camera gradually shows other undertakings outside Explorer. Then our protagonist Dr. Ryan Stone (Sandra Bullock), who is attached to a mechanical arm and doing technical test on a scanning system, appears. While Kowalski joins Dr. Stone to assist her removing the panel from the scanning machine, a cloud of debris accidentally hits and damages Explorer seriously. Dr. Stone loses control of her body and spins with the dismantled space shuttle, while we hear Kowalski urging her to detach herself from the mechanical arm. Finally, Dr. Stone lets go of the swirling mechanical arm and recedes quickly into the remote depth of outer space, further and further, until barely seen. Then we have the first cut in the film.

The drama of this opening scene involves a careful, constantly evolving orchestration of bodies and objects. The floating movements of Matt Kowalski across the positive parallax and negative parallax space along the Z-axis trajectory define the weightlessness and distance of outer space, gently foreshadowing the more violent and dramatic interactions that will later occur between human bodies, objects, and outer space. By contrast, Dr. Ryan Stone’s drastic swirling and receding into infinite depth by the end of the long take define the open-endedness and uncontrollability of outer space in a much more dramatic pattern, by choreographing the Z-axis, based on the relationalities between her body and the gravity-free boundless surroundings, to assert the immense scalability of 3D space. Director Alfonso Cuarón’s description of the “first cut” in the film following this opening long take explains how the filmmakers prioritise dramatic staging in depth over other concerns –

When we were doing the previs, as she (Ryan Stone) started floating away, I said, ‘We don’t need to cut. We can keep following her in the same shot, so the first two shots would be just one shot.’ But Chivo [the cinematographer] said, ‘I think when she’s floating away is the perfect moment to cut. If this were the chapter of a book, this would be the last phrase of the chapter.’ And he was right. Otherwise, we would have started calling attention to the long take and creating an expectation that that’s what the film was about. But that’s not what it’s about. (Benjamin B, “Facing the Void”)



**Figure 4.4** *Gravity* (Alfonso Cuarón, 2013) The opening scene (a 13-minute long take in deep focus) flamboyantly showcases mise-en-scène’s contribution to characterisation and dramatic relations and foreshadows the open-endedness of the entire film against the backdrop of boundless outer space. The complex arrangement of mise-en-scène space is complementary to the film’s minimalist narrative style.

By carefully staging depth along the Z-axis for interactions between characters, objects and the open-ended environment, and orchestrating cross-parallax movements, this opening long take becomes a kind of “live theatre” placed within an apparently weightless and boundless stage. Hence it gives us an opportunity to examine how the characters and the surrounding space define each other and produce dramatic questions. The outer space setting allows the filmmakers to explore the spatial dynamics of 3D in an environment defined by extreme open-endedness, effectively turning cinematic space on its head. Especially when the Explorer is destroyed by the cloud of debris, the instability of outer space reaches a peak as the previously peaceful environment becomes utterly dangerous. Throughout the nearly 13-minute long take, most of the actions and movements are deployed in the positive parallax space, except in two instances where characters and objects move briefly

across the 3D window and a little way into the audience space. This type of stereoscopically “spatialised cross-over” assists the filmmakers to explore human characteristics and conflicts via dramatic staging with extra depth, thus aligning with the core principle of *volumetric dramaturgy*.

The two cross-parallax effects are cleverly designed to induce a lifelike authentic experience in outer space for the audience. They emphasise the weightlessness of bodies and vastness of space via dramatic staging within the depth-oriented *mise-en-scène*, producing narrative progression out of a limited set of components. The first instance happens in the early stage (around 2’56”) of the scene, when Kowalski moves slightly across the 3D window into the negative parallax space, which only accentuates the human body’s gravity-free status and the peaceful side of outer space via the dramatic interaction between the character and elastic 3D space. Later, Kowalski drifts back to the fore-plane again but this time not across the 3D window before he recedes into the depths. The film thus evokes both intimacy and extreme distance, based upon the staging of Kowalski’s movements. The second cross-parallax action takes place at the midpoint (about 6’33”): a screw from the panel slowly drops down into the negative parallax space as Kowalski assists Dr. Stone to remove the panel in a medium two-shot. Before it intrudes too far into the audience’s space, Kowalski grabs it and gives it back to Dr. Stone, at which point they resume their work. Again, the effect is to bring us close to the performers against the backdrop of infinite space.

More importantly, by artfully choreographing Z-axis interplay between characters and objects in deep-space, the above two cross-parallax instances dramatically accentuate the weightlessness of bodies in outer space. Only in zero gravity conditions could Kowalski grab that falling screw so easily. Moreover, this dramatic action vividly portrays the characters: Kowalski is a veteran astronaut, while Dr. Stone, by contrast, is a newcomer to outer space. This moment also apparently pays homage to the famous emergence effect employed in Alfred Hitchcock’s classic 3D film, *Dial M for Murder* (1953): in the well-known murder scene, Margot (Grace Kelly) stretches her hand into the negative parallax space to reach for a pair of scissors and stabs the killer when he tries to strangle her from behind. This is the only point in the film where Hitchcock adopts a 3D “trademarked” effect, using it to highlight the most intensive dramatic moment of the story; during the rest of the film

he employs a deep-space strategy to present the dramatic interplays in a boxed-in “live theatre”. The above two cross-parallax movements in *Gravity* thus gesture towards the most dramatic moment in *Dial M for Murder*. All of these examples explore the spatial boundaries of the 3D mise-en-scène, but ultimately retreat into the space of the virtual stage. As in theatre, the movement of the actors involves an oscillation between intimacy and distance. Chris Parks, the stereoscopic supervisor of *Gravity*, has described in detail how 3D facilitates the dramatic “blocking” of performers:

We had a virtual camera at Framestore that let us control depth functions. When Sandra floated off in space, we separated her slightly from the star field, using 3D to make her feel very small. At another point we went very deep, when we see her POV as her hands reach out to those of another astronaut coming to camera. At the point when they make contact, we increased the interaxial to five times normal, then scaled it back down as they separate and drift apart. (Parks in Bordwell and Thompson, “Observations on film art”)

Bazin comments on the filmed-theatre works made in the 1940s: “The trump card that the director must hold is the reconversion into a window onto the world of a space oriented toward an interior dimension only, namely the closed and conventional area of the theatrical play” (1: 111). Although *Gravity* is far removed from the genre of filmed theatre, it invites reflection on the relation between spatial magnitude and narrative intimacy. The complex arrangement of mise-en-scène space in *Gravity* involves the projection of a limited number of narrative elements (characters and objects) against the backdrop of infinite space. It thus seems not only to open out narrative space, but also, conversely, to enclose it within a confined field defined by narrative economy and dramatic staging.

## **Conclusion**

The strategy of *volumetric dramaturgy* adopted by contemporary 3D filmmakers makes efficient use of both positive and negative parallax space, while increasingly shifting creative focus towards the former, to stage dramatic encounters among characters and surroundings. This type of *volumetric dramaturgy* has thus resonates with the emergent “Aesthetics of Recession” – exemplified by films like *Avatar* (2009) and *Coraline* (2009) – through which filmmakers have shown more and more interest in exploring positive parallax space, along with the use of deep focus and

longer shot durations. Over recent years, *volumetric dramaturgy* has become a prominent component of the “Aesthetics of Recession”, enabling the development of distinctive narrative strategies.

From a single close-up, to a dynamic deployment of shot/reverse shot; from a confrontation staged along a single corridor, to a long shot orchestrated in depth “across” several scenes, and even to the open-endedness of outer space, the range of spatial capacities of the case studies in this chapter indicates the diversity and effectiveness of *volumetric dramaturgy*. This major component of the “Aesthetics of Recession” provides 3D filmmakers with a variety of opportunities to innovatively stage depth through dynamic interactions among characters, objects and spaces across multiple depth planes for dramatic effects and narrative purposes. *Volumetric dramaturgy*, as an inherent constituent of the “Aesthetics of Recession”, is a new narrative schema for digital stereoscopic cinema that is still in the process of establishing itself. However, it may eventually lead filmmakers to realise the potential of the “cinematographic theater” (1: 123) that Bazin anticipated over sixty years ago.

## Chapter 5: Within and Without: Trans-Subjective Narrative Perspectives

“In effect, many classical theorists were suggesting that a narrative film employs an omniscient narrator, but they insisted that the film should limit our awareness of that omniscience. The invisible observer became the cinematic equivalent of the idealized implied viewer of the perspective picture or the effaced narrating consciousness of Lubbock’s ‘scenic’ novel”. (Bordwell, *Narration in the Fiction Film* 10)

In this chapter, I will discuss 3D’s capacity for multiplying cinematic narrative perspectives through spatial duality (the co-presence of positive and negative parallax space) and other immersive effects associated with the “3D field screen” (Miriam Ross). I will, firstly, define the key term “invisible observer”, introduced by the Soviet filmmaker Vsevolod Pudovkin and developed via David Bordwell and Edward Branigan’s discussion of its functions in 2D cinema; then, I will clarify how the placement of this imagined observer is different in 3D cinema. In particular, I will show how it is employed to emphasise the relationship between subjectivity and narrative perspective for both the characters and the spectator. Furthermore, I will argue that this narrational repositioning of the “imagined observer” has its parallel in 3D’s phenomenological reframing of the “intersubjective” relationship between viewer and film.

Here, I will draw upon Vivian Sobchack’s discussion of intersubjective and intrasubjective relations between film and spectators. Intersubjective relations render both the film and spectator as viewing subjects, which are also the visible and viewed objects to each other (15, 21-22); intrasubjective relations are the dialectical correlations of the pair’s “two embodied acts of vision...constituting the intelligibility and significance of the film experience” (24). Sobchack argues that the two views of film and spectator “constitute an experience that is not only intrasubjectively dialectical, but also intersubjectively dialogical” (24). Hence, she goes on to contend: “Cinematic vision, then, is never monocular, is always doubled, is always the vision of *two viewing subjects* materially and consciously inhabiting, signifying, and sharing a world in a manner at once universal and particular, a world that is mutually visible but hermeneutically negotiable” (24). By linking her work with the notion of the “invisible observer” and its relation to the “3D field screen”, I will argue that 3D

cinema reframes these phenomenological questions of “being seeing”, “seeing being”, and “being seen” (50).

3D cinema, I will argue, projects the figure of the “invisible observer” out into the space of the auditorium, complicating both intersubjective and intrasubjective relations between the film and its viewers. Distributing narrative planes and perspectives along the Z-axis, 3D cinema thus brings into question the customary relationships among spectatorial, narrational and character perspectives. I will show how 3D films reflect directly upon these altered subjective relations by producing *trans-subjective* narrative perspectives, in which the overlaying of narrational and spectatorial perspectives foregrounds the intrasubjective and intersubjective foundations of 3D cinematic viewing. My examples will be *Hugo* (2011, Martin Scorsese), *Sin City: A Dame to Kill For* (2014, Robert Rodriguez), *Life of Pi* (2012, Ang Lee), and *The Great Gatsby* (2013, Baz Luhrmann).

### **The Invisible Observer through the “3D Field Screen”**

An “invisible observer” is “an observer ideally mobile in space and time”; accounts of film narration that depend upon this notion suggest that “a narrative film represents story events through the vision of an invisible or imaginary witness” (Bordwell, *Narration in the Fiction Film* 9). Bordwell not only underlines the observer’s function as a point of articulation for “presupposed orthodox spatial construction”, but also points out that “the invisible observer, incarnated in the camera, could be identified with the narrator” (9). Although Bordwell is very critical of the notion of the “invisible observer”, dismissing it as classic film theory’s “all-purpose answer” to a large variety of narrative problems, he admits that it has been adopted by theories of literature and visual storytelling over a long period (9). An “invisible observer” sometimes is attached to a character, when it is in subjective narration articulated from a point of view of a character inside the diegesis; or, in most cases, an “invisible observer” is an omniscient and vicarious agent as “idealized implied viewer of the perspective picture” who is bonded with the placement of the vantage point. “It is not that the camera chooses the best spot from which to capture an independently existing event; figures, lighting, setting, and costume are constructed so as to make sense only from certain vantage points” (12). Therefore, no matter whether it is identified with a character, an idealised viewer, or the filmmaker, this “invisible observer” represents an anthropomorphically single vision from an idealised and fixed point of view,

although the image viewed by it may be mobile. This is the reason why Bordwell dismisses the “invisible observer” notion as the ultimate solution to solve all the narrative problems in 2D cinema.

Departing from Bordwell’s complete dismissal of the “invisible observer”, Edward Branigan defines its function as providing spectators with an ideal viewing angle on a scene. Branigan concentrates his theoretical emphasis on subjective point of view narrations, particularly the type of subjective narrative perspective mostly embodied by and associated with the point of view (POV) shot. “Thus we may define narration in the visual arts as a *positioning of the viewer with respect to a production of space*, and subjectivity as a *production of space attributed to a character*” (*Point of View* 64). By classifying film narration into different levels, Branigan picks out the “spatial properties” in the context of pictorial narration, and argues that they are “initially more important than other properties and hence may serve as a reference with which to measure the general activity of narration...such as, the placement and movement of the camera” (45). In so doing, he connects narrative space and character subjectivity closely and stresses the importance of both during the activity of narration:

Subjectivity in film depends on linking the framing of space at a given moment to a character as origin. The link may be direct or indirect. In the POV structure it is direct, because the character is shown and then the camera occupies his or her (approximate!) position, thus framing a spatial field derived from him or her as origin...What is important, therefore, in determining subjectivity is to examine the logic which links the framing of space to a character as origin of that space. (73)

Furthermore, Branigan concludes that POV structure is also based on viewers’ *assumptions* about the perceived cinematic space as three-dimensional continuation that can be stretched beyond the frame lines (*Point of View* 74). However, he insightfully points out the spatial contradiction in the POV shot: “In a real space the camera and character *could not* occupy the same point at the same time; nevertheless, in the POV shot they do exactly this and without interfering with one another” (74). He argues that the resolution of this contradiction is “through an ideology (that is, a reading convention) which takes the camera (and, more broadly, narration) to be *invisible* and the character to be *real*. Thus characters by not looking

directly into the camera – preserving its invisibility – gain the power to move freely within space and time independently of a ‘narrative’ or ‘spectator’ of which they must know nothing” (74). Although the viewer’s assumed “three-dimensional event” in 2D cinema is represented in a three-dimensional space, this illusory space is not presented via a real three-dimensional screen. Hence, the cinematic space in 2D film is reduced to the notable “something between” – citing Rudolf Arnheim, Stephen Heath puts it well when addressing movement and narrative space in traditional 2D cinema:

Phenomenologically, the result is characterized as “neither absolutely two-dimensional nor absolutely three-dimensional, but something between.” The “something between” is the habitual response to the famous “impression of reality” in cinema and it is this impression, this reality that are of concern here in their implications for a consideration of space in film. (Heath 27)

Therefore, the disparity of the 2D cinematic space—“something between”—and the viewer’s demanding assumption of a continuous and expandable three-dimensional space necessitates and legitimises the invisibility of the camera and hereby the invisible narration. Otherwise, not only would the subjectivity of a character in a narrative film be problematic, but also the sense of narrative wholeness and authenticity would be undermined. To stitch the gap between the “something between” of the 2D screen and the three-dimensional space of the story world, a narrative agent—the “invisible observer”, who could be a third-person narrator (i.e. an omniscient avatar of the director), or a first-person character in the diegesis—is needed to better anchor the spatial comprehension of the spectator. This is why Branigan summarises six “major components” for “invisible observation” under the strict context of “an analytical frame of reference that defines a spectator’s comprehension”, which are invisibility, ubiquity, alertness, neutrality, impersonality, and passivity (*Narrative Comprehension* 171-172). By emphasising the spectator’s active perceptual and cognitive response during the narrational process, he distinguishes his approach from the “orthodox theory of narration”, which overemphasises the unidirectional action of “giving narrative”; at the same time, he legitimises the “invisible observer” particularly during a spectator’s action of “receiving/participating narrative”. I concur with Branigan on this position and even take one step further by picking out his last three components of the “invisible

observer” – neutrality, impersonality, passivity, and arguing that these features are dynamised and made more complex in 3D cinema, adding new dimensions to the articulation of cinematic subjectivity.

Moreover, 3D cinema produces an overlap of the invisible observer with the film’s spectator through the commonly shared negative parallax space, thus frequently blurring the boundaries between a subjective and objective view of events. In short, 3D films often ask us to project ourselves into their diegetic spaces across the 3D field screen; meanwhile, they also cast characters or objects with real volumes into the spectator space, reminding us of the coexistence of different orders of subjectivity, both diegetic and non-diegetic. Here, the neutrality, impersonality and passivity of the invisible observer are coloured by our own sense of occupying the same space. The invisible observer thus takes on a little of our own subjectivity; at the same time, we may feel ourselves become aligned with the objective view of the camera to an extent that we would normally not when viewing a 2D film. The phenomenological and cognitive uniqueness of 3D cinema can be revealed by looking at the long tracking shot that opens Martin Scorsese’s 3D work *Hugo* (2011), observing the sensory configuration of the “invisible observer” in the 3D diegetic space and its effect on the spectator.

The opening long-take starts with a wide shot of the snowy Paris cityscape from a high angle bird’s-eye view to enhance the omniscient perspective of the “invisible observer”. While the perspective of the long-take is provided by an objective “invisible observer”, the moving trajectory and pace, which dynamically advances through and into the extensive depth with steadily smooth tracking rhythm, all suggests a vision from a subjective flying avatar—a bird or a fly, for example. With the Eiffel Tower composited prominently in the background, the camera tilts down slowly to display the central station in front of the Eiffel Tower and then begins to move forward aerially, flying into and through the platform with accelerated speed, passing by passengers, who either stand or walk on the platform. After tracking through a thick array of steam puffs emitted by the train, the camera continues to enter the main hall of the central station and travels through it, while busy passengers quickly pass in front of the camera. Then the camera cranes up and tracks into a huge clock on the wall that indicates seven o’clock exactly; continuing to zoom in towards the number “4”, the camera finally ceases by framing the close-up of little Hugo, who is looking at the station main hall through the space at the centre of the numeral.

As Branigan suggests, “The act of ‘telling’ or representing is first of all a creation of space, a display of the visual through acts of vision” (*Point of View* 73). This long-take as an entirety is a beautifully designed and smoothly dynamised visual introduction of the narrative space of the diegesis with the ultimate focus on the main character via the hyper-realistic aviation of an “invisible observer.” The CGI manipulation of the environment and movement obviously contributes to the rhythmic smoothness; however, the motion pattern of tracking forward overtly emphasises spatial depth and volumetric abundance by using stereo and motion cues successively. George Mather cites research indicating that “stereo cues [are] more heavily weighted at near distances, but motion cues [are] more heavily weighted at far distances” (Johnston et al. 1994 in Mather 288-89). During the early exterior phase of the wide shot, the motion cues function more while the stereo cues are deferred, so that the smoothly accelerating movement is accentuated. However, after the aerial wide shot penetrates into the platform of the central station in a long take, pedestrians’ movements and other activities close to the camera take precedence, meaning that stereo cues take over as the dominant force. As the camera travels through the platform and the station main hall and dynamically shows events “at near distances”, it reinforces the spatial depth and volumetric richness attributed to the primary stereo cues and the kinetic dynamics derived from the collateral motion cues.

When the camera elevates and moves toward the clock on the wall, reframing the image briefly as an extreme long shot, the motion cues take centre stage for a short time, before the stereo cues completely take dominance again when the camera eventually moves into little Hugo’s close-up behind the clock. The stereo cues and motion cues thus alternate, mediated by the binocular gaze of the “invisible observer” as it travels through a large range of spaces in this tracking long take. This unique “display of the visual through acts of vision” creates an extremely dynamic spatial progression, in which different objects/subjects are accentuated by different visual cues in different stages over the entire course of the shot. By alternating between stereo and motion cues in this way, the film’s opening shot mimics the affective experience of moving through space, and vests this experience in the virtual presence of the invisible observer.

The configuration of this mobile and transmuted spatial continuum in relation to a binocular “invisible observer” also entails multiple possibilities in terms of the transposition of narrative perspective. In other words, the augmented spatial

depth and sense of movement in 3D both foreground and enhance the process of what Jean Mitry called “subjectivising the objects”<sup>24</sup>, by playing on the spatial relationship between the visual objects and the imagined observer. The “neutral”, “impersonal”, and “passive” observer thus takes on qualities of subjectivity and engagement. As a result, the narrative perspective transposition in 3D is so different from the customary oscillation between the subjective and objective perspective in 2D cinema that I name it *trans-subjective* narrative perspective. The trans-subjective perspective involves a blurring of the subjective and objective, derived from the spectator’s ambiguous, illusory insertion into the “space” of the film.

By closely looking at Hugo while travelling through with the “invisible observer”, we as the viewer can sense and cognise palpably another subject behind the clock hand gazing at us from behind the 3D window. Moreover, since he is staring at the space that we have just navigated through bodily, we can easily build up the association between the two distinctive spaces – Hugo’s enclosed space, on the one hand, and the open space belonging to the “invisible observer”, on the other – demarcated by the 3D field screen between Hugo’s acutely displayed facial close-up behind the clock hand and us. This realisation further reinforces our own sense of subjectivity as an active perceiver opposite to both Hugo and the space he occupies. Our status now is from the “outside” perspective, which is different from our “inside” perspective moments earlier when we were bonded passively with the “invisible observer” travelling through the central station within the kinetic tracking shot. Hugo’s close-up makes us all of a sudden recognise that he is located in a distinct space, separated from ours.

To return to the tracking phase of the “inside” perspective, the volumetrically abundant spatial depth and directionally kinetic movement, accomplished by the combination of virtual camerawork and CGI manipulation, engulf the spectator with a palpable sense of the surrounding environment. Seeing and passing by the passengers on the platform or in the main hall, the spectator can cognise that the passengers are moving past and further away from her/him (behind the camera) while s/he being taken into the space that the passengers just leave, thus the “fourth wall” between the

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<sup>24</sup> Branigan borrows this term from Jean Mitry to articulate the concept of “an imaginary observer”: “In general, the problem is that of ‘expressive’ composition and movements, which Jean Mitry refers to as ‘subjectivising the objects’”. He also analyses two examples from *Jezebel* (Wyler, 1938) that Mitry used to exemplify the notion of ‘subjectivising the objective’. See *Point of View in the Film: A Theory of Narration and Subjectivity in Classic Film*. Berlin, New York, Amsterdam: Mouton Publishers, 1984. pp. 122; pp. 212-5.

spectator and the passengers has been effaced. Even if the spectator is not in the centre of the space that s/he is passing through and witnessing, s/he has a strong sense of being part of it, instead of being closed off from it in traditional 2D; because the spectator passively identifies with the anonymous “invisible observer” while actively involving and enjoying what s/he has perceived via it. This contradictory feeling brings out the “hyper-haptic” effect articulated by Miriam Ross: “It [the 3D field screen] can be understood as producing an overwhelming statement in which the audience is brought towards the screen space and taken through infinite depth planes...Significantly, the proximity of objects in the field screen threatens to engulf the audience, and this affects both vision and other senses” (“The 3-D Aesthetic” 385-6). This is precisely what we feel like when being taken through the cityscape of Paris and the central station with the flying invisible observer; as a matter of fact, the enticing hyper-haptic effect of the 3D field screen amplifies the sense that there is an invisible subject accompanying us.

Through the 3D field screen, conversely, an invisible observer can also bring a character and other properties across the 3D window and project them into the negative parallax space that is shared by the spectator. In this case, the “intruding” characters or objects are actually engulfed or surrounded by the limited auditorium space the audience shares. Sometimes, the two processes of crossover (audience transposition and character transposition) are exchangeable and take place simultaneously. For example, when the spectator travels through the platform with the invisible observer via the 3D window, the passengers walking on the platform potentially cross the 3D window and enter the space that the spectator has just travelled past. Ross further elaborates on the stereoscopic viewing experience:

At times, negative parallax suggests to the viewer that objects exist between them and the traditional plane of the screen. At other times, the eye is drawn into positive parallax that suggests objects and setting recede forever away from it. Rather than finding distance from the screen and a sense of mastery over the images, we consider and reconfigure our bodily placement in relation to the screen content. This factor, combined with the expansiveness of depth, means that while images may be clear and intelligible, they invite a more tactile exploration. (“The 3-D Aesthetic” 386)

Hence, during most of this tracking opening long-take in *Hugo*, even without the parallax crossover, the spectator's "inside" perspective is stressed by its "bodily placement in relation to" the passing passengers and spaces to confirm its identification with the flying invisible observer. However, after the camera settles on Hugo's close-up, when "we consider and reconfigure our bodily placement in relation to" his face and the clock hand, our "outside" perspective is reinforced because of the sheer demarcation (3D field screen) between the two separated spaces. This reconfiguration of the spatialising process is also actualised by the invisible observer, who occupies and provides the best possible angle for us to closely view Hugo's facial expression through the clock hand slit. Therefore, in both stages of this opening long-take, the spectator's "tactile exploration" of the 3D imagery is invited by the stereoscopic invisible observer enhanced by 3D's hyper-haptic effect. Therefore, even 'objective' shots in 3D have an additional subjective dimension, by virtue of their direct address to the bodily position and orientation of the spectator. This has substantially transformed the conventional line between subjective and objective perspective in 2D cinema.

In this context, the invisible observer becomes a nexus of alternation and association between character subjectivity and cinematic subjectivity. This in turn reminds us of the phenomenological relationship between the spectator and the 3D field screen. From the perspective of this cinematic subjectivity, 3D's dual spatial volumes suggest visions of the audience space that differ between the "inside" (from characters in the positive parallax space) and the "outside" (from characters in the negative parallax space). This double-status of 3D spatiality hence multiplies Sobchack's elaboration on the doubled cinematic vision of the 2D film viewing experience –

There are always two embodied acts of vision at work in the theatre, two embodied views constituting the intelligibility and significance of the film experience. The film's vision and my own do not conflate, but meet in the sharing of a world and constitute an experience that is not only intrasubjectively dialectical, but also intersubjectively dialogical. (24)

Therefore, trans-subjective narrative perspective (in which both the film and the audience function as active subject) can be further understood by applying Sobchack's film phenomenology theory to recent successful 3D works, based on

stereoscopy's binocular visual mechanism and its resulting viewing experience. By explicating Sobchack's ideas and analysing *Life of Pi* (2012) and *The Great Gatsby* (2013), I will argue that trans-subjective narrative perspective in digital 3D cinema contributes to stereoscopic storytelling via enabling new configurations of characters, film and audience subjectivity. Before getting to that argument, I will suggest some ways of connecting Branigan's theory regarding characters' subjective perspective with Sobchack's theory about cinematic subjectivity.

### **The Perspective, the Viewer and the 3D Field Screen: Intersubjectivity and Intrasubjectivity**

Exploring the origins of the Western concept of "perspective", Bordwell writes: "Perspective (from the Italian, *prospettiva*) means, we are reminded often enough, 'seeing through'—a handy way to recognize that both the object (the depicted world) and the subject (the viewer) are bound together through the picture plane" (*Narration in the Fiction Film* 4-5). According to the notion of "perspective", when we discuss cinematic narrative perspective, we must consider the dichotomy between the viewed diegesis and the viewing perceiver, through a mediated window (screen). By exemplifying Albertian "central" (linear) perspective and Leonardo da Vinci's synthetic perspective, Bordwell argues: "both 'scientific' systems presuppose a rule-governed, measurable scenic space organized around the optical vantage point of an implied spectator...With scientific perspective, the painting represented the spectator as a single eye, literally a point of view" (5). Bordwell makes two explicit points here: firstly, the perspectival principle governs and provides the "three-dimensional" image based on a monocular visual point of "a single eye"; secondly, only from a strictly fixed vantage point can we view the image through the picture plane for the best dimensional quality.

Furthermore, by comparing with Oriental inverse perspective that treats the spectator as the centre of the surrounding scene of the drawings<sup>25</sup>, Bordwell asserts that: "...in Albertian perspective, the scene exists as a three-dimensional event staged for a spectator whose eye is the picture's point of intelligibility but whose place is closed off from the event witnessed" (5). Hence a visual perspective always ties to a

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<sup>25</sup> Bordwell uses two illustrations, *Ippitsusai Bunchō* (1769), a Japanese traditional painting, and an Indian miniature created in late 18th century, to indicate the Oriental parallel and inverted perspective respectively, in Chapter 7, Narration and Space, in *Narration in the Fiction Film*. Madison, WI: The University of Wisconsin Press, 1985. 105.

certain narrative pattern by providing a particular point of view; while a narrative perspective does not have to attach to a single visual perspective, because narrative perspective is much more complex and multifarious (4-5). Indeed, there are many audiovisual devices such as camera angle, camera movement, voiceover, alongside point of view, that help establish a certain narrative perspective even in 2D cinematic storytelling. Therefore, in my following analysis, in order to avoid the confusion with the term of POV shot or a single point of view, I will use *narrative perspective* to stress the way in which the knowledge of spectators is linked with certain characters, and how spectators further engage and share sympathy with the characters.

Since stereoscopic cinema displays a genuine “three-dimensional” illusion, the acuteness of stereo space has replaced the vague “impression of reality” constituted by the “something between” in 2D cinema. We must therefore consider not only the new “spatial properties” of 3D cinema but also the narrational traits that accompany them. As one of the constituent parts of narration, stereoscopic narrative perspective is worth examining, because “[s]tereoscopic images may at first seem to continue the dependence on optical vision...but once the moving images are brought to life, so to speak, the abundance of depth planes provokes an immersive effect through which the body is located within and in relation to, rather than at a fixed distance from, the content” (Ross, “The 3-D Aesthetic” 383). The visual experience and bodily reaction to this “immersive effect” is fundamentally different from viewing 2D images, which are idealised from the perspectival vantage point “for a spectator whose eye is the picture’s point of intelligibility but whose place is closed off from the event witnessed” (Bordwell 5). Because 3D imagery produces additional visual cues, especially binocular depth cues, it augments the “movement” of the spectator described by Heath: “What moves in film, finally, is the spectator, immobile in front of the screen. Film is the regulation of that movement, the individual as subject held in a shifting and placing of desire, energy, contradiction, in a perpetual retotalization of the imaginary (the set scene of image and subject)” (Heath 53). By defining the movement of the spectator, Heath obviously means the spectator’s psychological and emotional reactions in the 2D context; while in 3D, besides these reactions, Ross’s remark stresses the phenomenological and bodily effects on the audience invited by stereoscopic images. “Stereoscopic moving images...take place within a 3-D field screen which exists alongside, and as an evolution of, the traditional and haptic screens” (385-6). The consequential “hyper-haptic” effect

transforms both the “movement” of the spectator described by Heath, and the intersubjective/intrasubjective relationship between the spectator and the film described by Sobchack. The 3D field screen sometimes projects the “invisible observer” incarnated by a character out into the space of the auditorium; while at other times, the “invisible observer” as a narrative function brings the spectator towards the 3D screen’s spatial duality and even takes it through the infinite depth planes. This double-directional tendency heightens and complicates both subjective spatiality (Branigan) and the dual subjectivity of the film and the spectator (Sobchack).

Of course, it must be acknowledged that the connotations of the word “subjectivity” in Sobchack’s writing are different from those in Branigan’s theory, in which subjectivity is particularly referred to in relation to characters within the diegesis and their subjective points of view. Nonetheless, I will argue that it is productive to consider these understandings of subjectivity as complementary rather than contradictory. Borrowing concepts from cognitive anthropology, Murray Smith regards “subjectivity” as the “structure of individual consciousness and imagination by cultural and ideological forces” (47). He uses the term to describe the incorporation of subjective imagination and cognitive ability for the spectator to understand and identify with fictional characters. Therefore, for Smith, the term “subjectivity” can be applied both to spectators and to characters in fictional works. Smith’s theorisation of subjectivity suggests a way of bridging Branigan’s and Sobchack’s approaches.

Analysing two types of subjectivity, character reflection (involving the physicality of characters) and character projection (involving their mental states), Branigan concludes: “Subjectivity, in the wider sense, then, becomes a symptom of much larger processes operating between text and spectator. Our concern, however, has been limited to the symbolic and secondary conditions which govern these processes – with the movement of filmic spaces and their justification in character” (*Point of View* 138). His focus is obviously on the relationship between the diegetic space and characters, and how characters conduct the subjective principal organisation of that narrative space (137). In Sobchack’s phenomenological context, however, subjectivity refers both to the viewer and the film as two viewing subjects as well as to the reflected relationship between them. This is precisely the “wider sense of subjectivity” Branigan refers to. Therefore, my discussion of the transposition of

narrational and spectatorial perspectives foregrounds the intrasubjective and intersubjective foundations of 3D cinematic viewing, but via the route of stereo narrative spaces where characters pose and move.

According to Sobchack's phenomenological film theory, cinema is not merely the being-viewed object but also the being-viewing subject. "Thus, in its existential function, it shares a privileged equivalence with its human counterparts in the film experience. This is certainly *not* to say that the film is a *human* subject. Rather, it is to consider the film a *viewing* subject—one that manifests a competence of perceptive and expressive performance *equivalent* in structure and function to that same competence performed by filmmaker and spectator" (22). Therefore, similarly and simultaneously, the spectator is not only the being-viewing subject, but the being-viewed object as well. Sobchack further argues: "Cinematic vision, then, is never monocular, is always doubled, is always the vision of *two viewing subjects* materially and consciously inhabiting, signifying, and sharing a world in a manner at once universal and particular, a world that is mutually visible but hermeneutically negotiable" (24). As we earlier allegorised the 3D field screen as a subjective counterpart, the "doubled cinematic vision" in 3D viewing may be accentuated by the subjectively doubled perspectives derived from the spatial duality across the 3D window. This cinematic subject can be linked to Branigan's subjectivity of character (point of view) through a flexible and agile invisible observer who travels through the stereoscopic space freely and alters its incarnation to a subjective narrator or character.

In the 2D context, the above two kinds of linked subjectivities may be overlapped merely via a character's subjective perspective throughout the film. In the 3D context, however, because the invisible observer's stereoscopic crossover between the two parallax spaces constitutes a dichotomy of disparate "inside" and "outside" placement across the 3D field screen, the perspectives that the spectator identifies with the invisible observer consequently complicate the distinction between "inside" and "outside" status. Hence, the viewer can build up both the dialectical and dialogical spatial relationship with any visual object/character in the diegesis via an actively commutative invisible observer across the 3D field screen. By so doing, the spectator further establishes a philosophically intrasubjective and intersubjective relationship with the 3D cinematic subject as a whole through the unique 3D viewing experience. In this way, these subjectivising objects/characters, in different parallax

spaces, can build up the existentially intrasubjective and intersubjective relationship with the spectator. According to Sobchack, both the 3D cinematic subject and the spectator embody a lived-body: “every lived-body is both the subject of perception and expression and an object for perception and expression, every lived-body lives the commutation of perception and expression in a *simultaneously subjective and objective modality*” (41). Hence, “all film presents not only the seen but also the seeing” (134). These relations are both foregrounded and transformed in 3D. A more active and kinetic stereoscopic invisible observer, moving across the 3D field screen, amplifies both character subjectivity (as described by Branigan) and intersubjective and intrasubjective relations between the spectator and the 3D cinema (as emphasised by Sobchack).

Taking three components of Branigan’s categorisation of the “invisible observer” – Neutrality, Impersonality, and Passivity, I will argue that 3D’s more active and subjective invisible observer further complicates the three phenomenological questions of “being seeing”, “seeing being”, and “being seen” (Sobchack 50). *Sin City: A Dame to Kill For* (2014) will be used as an example for my discussion of how cinematic subjectivity becomes more mobile and complex in 3D through the film’s rendering of the invisible observer as a “visible presence” and viewing subject. This incarnated visible/invisible observer complicates the intersubjective and intrasubjective relationship between the spectator and 3D cinema, thus paving the way for the formation of a unique stereoscopic trans-subjective narrative perspective.

Robert Rodriguez’s 3D work *Sin City: A Dame to Kill For* (2014) is the sequel to his stylish and successful *Sin City* (2005). It is based on Frank Miller’s comic book series *Sin City* and is, like the first film, co-directed by Miller and Rodriguez. It also repeats the previous *Sin City*’s multi-plot narrative structure and stylised visual look – with a mix of live-action and graphic drawing, in which a monochrome palette is punctuated with isolated dashes of colour. There are four interwoven storylines: “The Long Bad Night” and “A Dame to Kill For” are comparatively independent stories, while “Just Another Saturday Night” and “Nancy’s Last Dance” are more interlaced and overlapping. The film begins with “Just Another Saturday Night”, which sees the return of Marv (Mickey Rourke) as well as Nancy Callahan (Jessica Alba), who dances at Kadie’s Saloon where Marv always goes to watch. After the other two stories are done, the film resumes with

Marv and Nancy in “Nancy’s Last Dance” and ends up with the duo teaming up for Nancy’s final vengeance on Senator Roark by killing him in his heavily guarded mansion.

Although few critics (even those who gave the most positive reviews) appreciate the depth strategy Rodriguez and Miller applied in this natively shot 3D film<sup>26</sup>, I argue that the depth in *Sin City II* contributes to its narrative dimensions, instead of mere visual spectacle. Here, visual depth is consistently maintained yet also limited and discreet; the film eschews conspicuous protrusion effects or exuberant showing-off of the positive parallax. On the other hand, the added visual depth is complicated by the presence of a *literal* incarnation of the invisible observer, the ghost of John Hartigan (Bruce Willis), throughout the opening and ending stories. Having Hartigan stand in as a virtual representative of the invisible observer, the film highlights not only the subjectivity of the character but also the intrasubjective and intersubjective relation between the spectator and the 3D cinematic subject.

We can consider *Sin City II*’s literalisation of the invisible observer as a kind of meta-reflection on 3D cinema’s spatial articulation of subjectivity. According to the six “major components of one common type of invisible observation” summarised by Branigan, Hartigan’s ghost as an “invisible observer” attached to a character/narrator fits perfectly into the first three categories, which are Invisibility, Ubiquity and Alertness; while, to a certain extent, this invisible observer subverts Branigan’s latter three aspects: Neutrality, Impersonality, and Passivity (*Narrative Comprehension* 171-2). From his first appearance in the story of “Just Another Saturday Night” in Kadie’s Saloon where Marv watches Nancy dance on the strip bar, Hartigan’s ghost is ignored by both the passing waitress and Marv; so he is invisible in the diegesis as “an eavesdropper who is unheard as well as unseen” (171) by other characters. Later in the first part of “The Long Bad Night”, when the young cocky gambler Johnny (Joseph Gordon-Levitt) enters Kadie’s Saloon, again he overlooks Hartigan’s ghost, who happens to pass by him while watching Nancy dance. So far, Hartigan’s invisibility as a ghost in the diegesis has been reaffirmed, especially for the spectators who have seen the previous *Sin City* and been reminded that Hartigan committed suicide for Nancy’s survival.

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<sup>26</sup> “Siggraph: New VFX Details Revealed on ‘*Sin City: A Dame to Kill For*’” *Hollywood Reporter* website, by Carolyn Giardina. Web. (Accessed 31 August 2013): <http://www.hollywoodreporter.com/behind-screen/siggraph-new-vfx-details-revealed-725013>.

Although Hartigan's ghost is visible for the spectator, he demonstrates certain qualities of an invisible observer: invisible to the other characters, he is able to move at will through diegetic space, articulating a viewpoint on the action. Although it would be going too far to suggest that Hartigan literally occupies the perspective of the invisible observer (particularly since we can see him within the film's world), at certain points his bodily perspective becomes closely aligned with the camera, so that we look through him, taking in his view of the action. Hartigan can thus be seen as a literalisation of the "invisible observer"; like the object of Branigan's formulation, he can appear anywhere in the diegesis, because he "has the ability to move instantaneously throughout scenic space and to remember what has been seen and heard" (*Narrative Comprehension* 171). We see him haunt every scenic space in which Nancy appears: Kadie's Saloon strip bar, her dressing room, her bedroom, and later Senator Roark's mansion. Hartigan is also very attentive to crucial events. For example, when Nancy dances on the strip bar and attempts to kill the passing Roark, it is the "invisible observer" (via Hartigan's POV shot) that provides us the perfect angle to perceive closely her struggling to pull the trigger. Here, the alignment of the film's own "observer" with this metaphorical "observer" stresses the attentiveness of Hartigan as a literalised "invisible observer". Later, in Nancy's dressing room, it is Hartigan again who carries us to the best position to look at Nancy herself scratching her beautiful face with a shard of broken mirror; so that we feel as helpless as he does. All of these placements of the ghostly Hartigan as the invisible observer underline his ubiquity and alertness: he is focused "on the action at all times," viewing via the "perfect angle" and the "appropriate shifts in distance" (Branigan, *Narrative Comprehension* 171).

However, this invisible observer is not simply an omniscient objective onlooker, but a more active, more personal, and less neutral subjectivity who shifts between narrator, character, and spectator at various times. Furthermore, in the climactic scene, it is temporarily "double-identified" as both the character subject and the cinematic subject. In terms of the invisible observer's neutrality, Branigan means that it "assumes a 'standard,' often straight-on angle to the action. By contrast, an 'eccentric' or awkward angle...would be interpreted simply as a failure of ubiquity...or as an emotional reaction, emphasis, or evaluative judgment on the action...a more powerful and intrusive narration" (*Narrative Comprehension* 171). In *Sin City II*, however, without a failure of ubiquity and a sense of intrusiveness, and

without interrupting the main plotline, ghostly Hartigan as the invisible observer does occupy some “eccentric” angles occasionally and emphasises the subjective perspective and emotional involvement for the spectator.

For example, in the above mentioned scene in which Nancy attempts to kill Roark but cannot pull the trigger, the close-up of her fumbling fingers provided by Hartigan’s best angle (POV) communicates her panic so effectively that we suddenly realise, as does Nancy, that this is not a good time to execute her revenge. Although Hartigan as the invisible observer stands far from the bar stage, his POV captures the best angle to notice the dancing Nancy’s impulse and hesitation while other characters are unaware of it. Intercutting with Hartigan’s facial expression in close-ups, the privileged “eccentric” angle stereoscopically emphasises his deep worry about Nancy and conducts this emotion to the audience while still maintaining his ubiquity and unobtrusiveness as an invisible observer. Similarly in Nancy’s self-mutilation scene, the close-ups of Nancy through Hartigan’s perspective from her rear side bring her extremely proximate to both him and the audience. This visual proximity, along with his voice-over, in which he tries to convince her not to do it, manifests his emotional bond with her. On the other hand, his reflection standing in the depth of the mirror distances him from her both physically and spatially in order to underscore his helplessness. Because Nancy cannot hear Hartigan’s present plea to her while the spectator can, this discrepancy works with the simultaneous proximity and distancing effect contradicted by his both visible and invisible “presence”, emphasising the spectator’s feeling of helplessness as much as his.

Identified with Hartigan’s perspective as the invisible observer (both as character and narrator), the spectator can feel Nancy’s pain, her obsession with revenge for him, and the care and helplessness as he stands in the far-off depth plane of the diegesis. As a less neutral, more personal and active invisible observer, and also as a visible character, Hartigan’s “eccentric” angle (both proximate to, and distant from, Nancy) is accentuated by stereoscopic depth. This effect produces a kind of relay between subjective and objective perspectives, as Hartigan becomes a virtual stand-in for the invisible observer, “subjectivizing” it in the process. Meanwhile, his invisible observation inside the diegesis (as a character) and its identifiable association with the spectator outside the diegesis (as an avatar of narration) pave the way for my following analysis of the intrasubjective and intersubjective relation between 3D cinematic subject and the spectator.

Another “eccentric” angle supplied from the subjective perspective of the invisible ghostly Hartigan concludes the scene in which Nancy huddles up in bed. Nancy has just woken from a nightmare of Senator Roark harassing her and threatening to kill her in her bedroom. A series of extreme high angle (bird’s eye view) long shots set squarely above Nancy, who is huddling and crying on bed, give the spectator a strong sense of Hartigan’s stealthy presence and his helpless surveillance of, and concern for, Nancy, although he has been invisible and inaudible during the entire scene. This subjective, personal and emotional high angle, along with the stereoscopically augmented depth, the distanced and closed space, manifests Nancy’s bedroom as an engulfing deep well or container and accentuates the claustrophobic atmosphere of the scene. Hence, through Hartigan’s subjective invisible observational perspective, the spectator may not only feel Nancy’s torment struggling in this jail-like space, but also identify with Hartigan and sense his helplessness and agony because of the augmented depth and the enlarged distance. Moreover, the gradually increased depth and distance within this series of dissolved long shots induces the spectator momentarily to recognise a distinctive viewing subject with stereo depth and volumetric roundness, which is different from a flat 2D screen, precisely looking back at, while retreating from, the spectator. This effect vividly substantiates what Sobchack contends: “[A]ll film presents not only the seen but also the seeing” (134).

In the climactic scene, when the invisible Hartigan suddenly becomes visible as part of Senator Roark’s hallucination and calmly stares towards the audience, he pictorially transforms from a character subject to a kind of anthropomorphised cinematic subjectivity. He stands not only for himself but for the film’s own narrational discourse. By interrupting Roark as he prepares to pull the trigger, Hartigan actively and personally involves himself in the narrative and helps Nancy accomplish her vengeance. Meanwhile, by standing in a deep plane with volumetric roundness and staring at the spectator, Hartigan vests the 3D field screen with the humanised qualities of a unique alive *self*, which takes part in a complicated intrasubjective and intersubjective relation between *itself* and the spectator. As Sobchack states:

Just as there is a primordial human subjectivity that anonymously provides the ground upon which Self can figure in a relation that is reflective and

intrapersonal, so also is there a primordial and anonymously lived cinematic subjectivity that provides the ground upon which a self-conscious cinema can figure as a reflection upon and interrogation of the nature and function of its own being. (135)

No matter whose vision, the spectator's or the film's, both "organized structure" and "organizing activity" become much more volumetrically plentiful and dialectically dynamic in 3D cinema. Articulating the vision of 2D film, Sobchack argues: "It not only understands the world haptically but also proximally, that is, in terms of a spatiality that is lived as intimacy and distance in relation to the objects of its intentions" (133). Given 3D cinema's capacity to draw on both stereo and motion cues, I argue, the spectator's vision is more haptically and proximally multiplexed than it is in relation to 2D films, not only because of 3D's negative parallax shared with the audience space, but more importantly because of its articulation of a "hyperhaptic visuality". Ross puts it: "The hyperhaptic quality of 3-D films introduces depth...a depth that includes texture and the desire to touch and be touched by this texture" ("The 3-D Aesthetic" 384). Her statement suggests the "texture" of 3D imagery is a subjective presence or entity that engenders the spectator's strong desire to approach and be approached by this cinematic subject. The 3-D field screen, therefore, multiplies the intrasubjective and intersubjective relations between the audience, the visual subjects and other properties in both positive parallax and negative parallax space; so that narrative perspectives in 3D cinema are complicated by the addition of depth and dimensionality.

Accordingly, Ang Lee comments in detail on why the availability of 3D devices eventually convinced him to take on *Life of Pi*, a book which he once insisted "unfilmable":

Two things changed my mind...One is that if I can find a third-person and a first-person that's the same, so we have the examination of the third-person perspective, in this case [it is] the older Pi telling the story and the younger Pi experiencing it. If they are the same person, maybe I can pull this off. Then I had a silly thought: if I do it in 3D, maybe with another dimension that number keeps on running forever, maybe I can see a circle. [With] another dimension, maybe things will open up. ("Exclusive Live Video Interview")

Perspective is particularly essential to certain types of cinematic narrative in films such as *Life of Pi*, *The Great Gatsby*, and it always depends on qualities of spatiality and dimensionality; nonetheless, 2D visuals are subject to dimensional limits that constrain their capacity to deliver multi-perspectival visual storytelling. Therefore, a specific type of 3D narrative perspective, which I have been calling *trans-subjective* perspective, has been more and more apparent in recent stereoscopic films.

### **“Within” and “Without”: *Trans-Subjective* Perspective in Stereoscopic Narrative**

My analyses in this chapter concentrate on how conventional cinematic techniques are incorporated with the stereoscopic mode in order to constitute *trans-subjective* narrative perspectives in diverse forms. In this section, I will in particular identify and analyse features of *trans-subjective* narrative perspective with reference to two 3D film examples, Ang Lee’s *Life of Pi* (2012) and Baz Luhrmann’s *The Great Gatsby* (2013). I will use two key words of the narration from Nick Caraway, the narrator in *The Great Gatsby* (2013), “within” and “without”, to articulate how *trans-subjective* narrative perspective functions in contemporary 3D cinema. By analysing each of these films, both of which are adapted from popular literature, I argue that the 3D *trans-subjective* narrative perspective they adopt not only contributes to the spectacular aspect of stereoscopic storytelling, but also helps thicken each film’s narrative dimension and thematic richness.

Because of the blurred boundaries between a subjective and objective view of events, and the magnification of cinematic subjectivity through volume, the 3D field screen gives rise to the possibility of bidirectional transpositions (mediated by the “invisible observer”) between the spectator and the diegesis in both their shared and respectively occupied spaces. As a result, *trans-subjective* narrative perspective both foregrounds and complicates the intrasubjective and intersubjective foundations of cinematic viewing.

In Baz Luhrmann’s spectacular 3D adaptation of Scott Fitzgerald’s classic novel, *The Great Gatsby* (2013), character relationships and the drama based on these relationships are essential to the success of the film. Like most of his prudent 3D filmmaking predecessors, Luhrmann prefers to explore in the positive parallax – behind the 3D window space – by integrating traditional cinematic techniques, such as shot scale, *mise-en-scène*, particularly character blocking, positioning and movement. Throughout the whole film, Luhrmann only deploys mildly emergent

effects in the negative parallax for the stylish textual overlays that sometimes accompany Nick's voiceover narration and for the ending credit sequence. For the extravagant party scenes and other highly dramatic scenes, he actually does not use any (even the mildest) emergence effect at all. However, he cleverly exploits stereoscopic visual characteristics, such as volumetric abundance and enlarged spatial distance, by setting the main scenes in Gatsby's huge West Egg mansion and the spacious East Egg mansion of Tom and Daisy. By contrast, in order to increase the dramatic tension through a comparison between the underscored spatial distance and the psychological conflict, Luhrmann also chooses an enclosed hotel room and Nick's small house as settings for crucial plot point scenes that drive the narrative forward. In so doing, characterisation and character relation development are always put in the first place; while stereoscopic devices are used to characterise these settings as vivid perceiving characters by depth manipulation in their own right, who conspire with Nick as live observers and serve as witnesses to the triangular affairs that gradually ferment between Gatsby, Daisy and Tom.

Nick Caraway, Jay Gatsby's neighbour, is both the subjective storyteller and a character inside the diegesis. His self-identified role as "both within and without" is accentuated periodically by spectacular sequences which show the words (letters) he has written, superimposed stereoscopically over his close-ups. Nick's subjective narrational perspective is particularly stressed by these synthetic sequences of text and imagery, along with his voiceover. When Nick begins writing "*grotesque place...*" in the sanatorium with the superimposed text floating laterally over his close-up and then over a close-up of Dr. T. J. Eckleburg's eyes on a large commercial billboard, the film establishes its dual narrative perspectives: Nick's subjective perspective and the God's-eye omniscient perspective associated with the billboard. The vulgar party in an apartment in New York City to which Tom brings Nick starts with Nick's voiceover and a few letters of his narration superimposed on a close-up of him typing in the positive parallax. Then the big multi-coloured word "*AFTERNOON*" protrudes into the negative parallax, from "N", "O", "O", letter by letter. This "protrusion effect", which is rarely seen throughout the whole film, brings up one of the stunning spectacular visions and at the same time implies that an "invasive event" is upcoming. Soon after, a wild obscene party involving Nick, Tom and his secret lover Myrtle takes place in the plaza room. Incorporating Nick's voiceover, this protrusion effect configured by the graphic letters jutting out into the audience's space accentuates

Nick's subjective narrational perspective from both "within" (as a participant in the event) and "without" (as the narrator of the event).

During the party full of alcohol, drugs, dirty dancing, and sexual profligacy, the drunken Nick staggers to the window and looks outside while the chaotic event goes on in the background. After a series of frame-in-frame shots, which illustrate neighbourhood residents reacting to the party through open windows, swell up from the deep planes and move forward to cross Nick's close-up in the fore plane, he suddenly sees himself in a neat suit with innocent smile standing at the corner of Washington Street. It is then revealed that he is actually looking at himself through the apartment window. This self-reflexive sequence with staged depth provides a bidirectional subjective narrative perspective from both the innocent, sober Nick standing outside as the storyteller and the drunken Nick in the apartment as the experiencing character, who is completely distanced from the former, through the enlarged spatial distance in the high angle long shot. Moreover, superimposed over the images, the graphical texts "WITHIN" and "WITHOUT" sweep across the 3D window horizontally, occasionally emerging into the negative parallax slightly and then receding. Accompanying Nick's voiceover about his role being "within" and "without", this text combines with the imagery to reinforce Nick's double-status as a subjective storyteller and also a character subject.

The third spectacular sequence rendered by subtitles is towards the ending. After Nick has arranged Gatsby's funeral, he walks lonely along the street while the snow falls around him. The slowly dropping snowflakes gradually transform into floating letters and then some of them form words continuing to flow in front of Nick's melancholic close-up, as we hear Nick's despondent narration, which implies his getaway from New York City. A few letters swell up again and drift across the 3D window, move slightly into the negative parallax, and then recede, disappearing. This closing snowflake-letter sequence in both positive and negative parallax spaces, integrating with Nick's close-up with volumetric contour, concludes Nick's double status as both a "within" character and a "without" narrator and his subjective narrational perspective when telling the story about Gatsby, Daisy and Tom.

Besides the cross-parallax graphic letters, the use of staging in depth also works to highlight Nick's "within" and "without" double status by emphasising spatial distance between characters; so that Nick is always distinguished from Gatsby as a quiet observer within the diegesis and a subjective portrayer of Gatsby outside

the diegesis. For instance, the after-party conversation scene between Nick and Gatsby reinforces Nick's perspective on Gatsby, as both a character befriending him and reminding him ("Jay, you can't repeat the past!") and as the storyteller, by distancing Nick from Gatsby spatially while Nick listens to Gatsby's recollection of his first kiss with Daisy. The long shots of them moving toward and later away from each other, and the two-shots of them both walking forward with multiple spatial planes in between, effectively underline the spatial distance between them. When Gatsby recollects his story about himself and Daisy, he is mostly singled out in medium close-ups. When the film cuts back to Nick's close-ups, because of the distancing separation of the two characters emphasised in the long shots, the spectator is easily identified with Nick as a caring observer and listener. Therefore, the spectator empathetically imagines the romantic relation between Gatsby and Daisy recalled by Gatsby but through Nick's observational vision. Thus Nick's double status as both subjective narrator and observational subject is highlighted by the stereoscopic emphasis of spatial distance and depth.

There is a brief over-shoulder shot/reverse shot sequence after the flashback of Gatsby and Daisy's first kiss, in which Nick reminds Gatsby again that he cannot repeat the past and Gatsby retorts: "Of course you can!" As we analysed in the last chapter, the over-shoulder shot/reverse shot technique in stereoscopic mode may amplify dramatic conflicts by accentuating the spatial obstacles (such as the shoulders of characters occupying the foreground planes). The above-mentioned over-the-shoulder shot/reverse shot sequence between Nick and Gatsby literally emphasises the overt disagreement between Nick and Gatsby regarding his future with Daisy. Through the depth-oriented camerawork, the spectator again is reminded that Nick is not only an observer and narrator "outside" the relationship between Gatsby and Daisy, but also a character "within" their affair.

The volumetrically abundant stereoscopic aesthetics of 3D are precisely suited to exploring the multiple-themed original novel from F. Scott Fitzgerald. Paralleling Nick's subjective narrative perspective underlined by stereoscopic techniques, there is a God's-eye view omniscient narrative perspective symbolised by Dr. T. J. Eckleburg's eyes with a pair of glasses on the outdoor commercial billboard in the "Valley of Ashes", which is also emphasised throughout the film. This billboard, which might otherwise appear to be a background element within the *mise-en-scène*, becomes both a repeated visual motif and also a point of articulation for

narrative perspective. These disembodied eyes seem not only to be looking but also passing judgement on the events taking place before them. This more distanced, objective view contrasts with and complements the more subjective perspective provided by Nick.

Although there is no POV or reverse shot from the angle of the billboard, the stereoscopically amplified depth starkly distances this image of Dr. T. J. Eckleburg's eyes, which is always deployed in the deep planes of the background, from other events that take place in the foreground of the valley. The resulting effect is that this pair of eyes, a perspective in between objective and subjective, looks closely at the entire valley from a distance and knows what exactly takes place down there all the time. Until the climactic car crash, this obscure "in-between" perspective transforms into a subjective perspective by descending to the eye-level of spectators and deepening the distance from them, in order to substitute for Nick's narrational absence and establish its own narrative authority. This alternation between Nick's subjective narrative perspective and this apparently omniscient one links the thematic motif of "God's ultimate judgment" to the interchangeability and interactivity between the two subjectivities of the spectator and the 3D cinema.

The first time Nick starts to write his story and he mentions the "place", Dr. T. J. Eckleburg's eyes come into view in the deep planes of the background, staring at the spectator. After that, every time the main characters drive by the gas station through the "Valley of Ashes", the spectator sees that pair of omniscient eyes without any expression in the stark deep planes. In the climactic scene, an accident happens right in front of the billboard when Gatsby's car crashes and kills Tom's mistress Myrtle. It is the first time that we see the pair of eyes on the billboard in a close-up, though still in the deep planes, via a ratchet focus shot shifting from the crashed Myrtle in the fore planes falling out of the frame in slow motion. Since Nick as the main subjective narrator of the entire story does not witness the accident in this climactic scene, this highlighted "God's-eye view" (from the perspective of Dr. T. J. Eckleburg's eyes on the billboard) provides an authoritative and intensified point of view on this dramatic peak moment for the spectator.

Later, when recollecting the accident, Gatsby tells Nick that it was not he but Daisy who drove his car and killed Myrtle. However, the truth about who caused the accident is confirmed by the reinforced close-up of the God's eyes staring at us soberly in the distance after witnessing the accident. Also at this point, the pair of

God's eyes is not viewed from a high angle any longer, but is instead positioned at the same eye level as ours, as we witness what has just happened straight in front of our eyes. Moreover, since the rack focus shot in stereoscopic slow motion emphasises the volumetric roundness of the rolling Myrtle in the foreground and the stark distance between her and Dr. T. J. Eckleburg's pair of eyes in the background via the spatial abundance, the resulting visual effect is contradictory. The "God's eyes" seemingly watch the accident happening very closely but from a distance. The viewing distance augmented by the stereoscopic mechanism and the lowered eye-level angle reinforce the transformed perspective from the previous "God's-eyes" view, thus the authenticity of the car accident is both confirmed and heightened visually. Thereby the double narrative perspectives of the film – Nick's subjective perspective and the omniscient perspective of the God's eyes – get both complementary pay-off and respective legitimacy.

As a visible observer and character in the diegesis, Nick's "within" and "without" double status represents the subjective perspective from a character subject. Dr. T. J. Eckleburg's eyes in glasses, as an invisible observer who has been ignored by all the characters except Myrtle's "dull" husband Wilson, allegorise the other transformative omniscient perspective and eventually authenticate and highlight the phenomenological redemption of the car accident "inside" the diegesis. While observing from "outside" the action (although technically within the diegesis), the volumetric glasses and eyes of Dr. T. J. Eckleburg distinctly configured in different depth planes and the foregrounded image of Myrtle falling in slow motion engender a self-reflexivity of 3D both being viewed (Myrtle falling in the air) and being viewing (Dr. T. J. Eckleburg's eyes in glasses). The *self* of the spectator is thus simultaneously projected into, and reflected by, the "lived cinematic subjectivity" represented by Dr. T. J. Eckleburg's eyes in glasses, hence crystallising the intrasubjective/intersubjective relationship between the spectator and 3D cinema.

Moreover, at a given moment, when Dr. T. J. Eckleburg's eyes stare at the spectator, who is staring opposite at the 3D screen, the two views of these two viewing subjects (the spectator and the 3D field screen) are mediated and associated via the invisible observer, who has been made visible and incarnated, by a kind of meta-reflexive gesture, in the image of the two all-seeing eyes on the billboard. If the view of God's eyes from the deep volumetric planes is "within" the 3D field screen, the spectator's vision in the auditorium provides an opposing view. Momentarily, the

pair of Dr. T. J. Eckleburg's eyes on the billboard descends to the same eye level as the spectator's and stares at us from the depths of the image. However, there is always a shared diegetic world in between, which is elucidated differently by the two viewing subjects through their opposed viewing perspectives. Inside the diegesis, the characters' double status of "within" and "without" each of the dual parallax spaces complicates the narrative perspectives, thereby making the intrasubjective/intersubjective relationship between the two viewing subjects – the spectator and the 3D screen itself – conspicuously complex. This complexity in stereoscopic storytelling has been actualised via a type of trans-subjective narrative perspective in *The Great Gatsby*.

Similarly, In *Life of Pi*, the trans-subjective narrative perspectives dichotomised by perspectives located "within" (represented by the young Pi) and "without" (embodied by the elder Pi) serve to underline the film's profound thematic revelations. As we analysed earlier, Ang Lee tries to deal with philosophical issues relative to religious belief through a story about an Indian boy Pi and a Bengal tiger struggling to survive with each other on the boundless ocean. To establish a big enough scale for the film's dialectical questioning of existence and truth, and also an appropriate framework for the narrative, Lee intentionally adopts a double-status narrative perspective to unfold the story. The first, also the main perspective, is from "without" through the elder Pi recollecting his survival story with the Bengal tiger, Richard Parker, to the novelist Yann Martel. Although this is a subjective narrative perspective completely from the elder Pi's point of view, his peaceful and mature voice provides a more distanced and restrained subjective perspective since he starts his story from his childhood decades ago. The second perspective, which is the minor one from the younger Pi and underlined by two "stereo-layered" montage sequences showing his struggles to survive with the tiger at sea, only stands out occasionally in the entire film. However, by dichotomising the perspectives, Lee not only finds a way of rendering first-person and third-person perspective simultaneously, but also takes advantage of 3D's dual spatiality (consisting of volumetric space in the negative and positive parallaxes) to produce a form of trans-subjective narrative perspective. The third dimension precisely provides a space to illustrate the "within" and "without" narrative distinction, by inserting the 3D zero-parallax window in between the two perspectives.

The film's two "stereo-collage" sequences are basically comprised of three layers of images: in the first layer, Pi writes his journals and reads a survival manual; the second layer is about his boring life at sea; the third layer is about his interaction with the tiger, Richard Parker. Scott Higgins gives an articulate analysis of the film's two elliptical montage sequences, which are synthesised by digital special effects and distinguished by 3D visual traits:

Depth helps clarify the sequence. In 2D it seems odd to see two images of the same character at different points in the story superimposed in sharp focus. The stereo separation between the planes in 3D somehow reinforces the temporal distance between events. In 2D, the images appear as flat collages, but 3D provides an elegant coordination of space and time. ("Pi Eyed")

Though the two sequences have essential functions within the narrative structure and as demonstrations of stereoscopic spectacle, along with younger Pi's voiceovers paralleling the images, these "stereo-collage" sequences emphasise a more subjective "within" narrative perspective than a third-person objective one. So does the final climactic scene, in which the younger Pi retells the revised version of his survival story to both the Japanese insurers and the spectator in a "floating 3D window" long take. All of these depth-configured sequences underscore the young Pi's overtly subjective "within" perspective that is different from the elder Pi's "without" perspective, which is more distanced and mature, but subjective as well. Although accentuated only a few times, the younger Pi's "within" perspective is as important as the dominant "without" perspective of the elder Pi. The dichotomous "within" and "without" narrative perspectives, in a both intrasubjective and intersubjective relationship to each other, work complementarily to build up the film's diegetic space and thematic framework for Lee to draw out the religious and philosophical messages.

It is worth noting that during all these "outstanding" stereoscopic sequences, the parallel audio components (whether dialogue or voiceover) indicate variable degrees of contradiction to the visually compelling imagery. This is revealed, for instance, towards the end of one stereo-collage sequence, in which Pi, after reading the survival manual on the lifeboat, tries to write a survival manual with a tiger based on his personal experience, but Richard Parker's reaction quickly and ironically proves his words wrong. Also in the climactic scene, despite Pi's overwhelmingly emotional retelling of the revised version of his survival story, the two Japanese

insurers simply respond with a long silent pause, indicating that they cannot be convinced by his revised story. During Pi's monologue in the long take zooming from a long shot into his close-up, which shifts forward stealthily from behind the 3D window into the negative parallax space slightly and closer to the audience, we temporarily realise that a viewing subject is sitting opposite and talking directly to us. Incarnated by the younger Pi's exaggeratedly emotional and slightly protruding facial close-up, this viewing subject gazes at and tries hard to communicate with the spectator, by telling a new version of his "within" perspective, which is fundamentally different from the elder Pi's "without" perspective. The interactive gaze between the spectator and the character visualises the projection and reflection of a *self* between these two subjectivities interchangeably. Furthermore, the 3D-induced proximity of Pi's close-up makes the spectator gradually aware of another subject – the "lived cinematic subjectivity", who has transformed from the character subject (again, a doppelganger) and stares at the spectator, thus foregrounding the intrasubjective/intersubjective relationship between the spectator and 3D cinema.

In between the two viewing subjects – the spectator and the 3D screen itself, there are two versions of Pi's survival story, one from the "within" perspective, the other from "without", plus the spectator's own version based on her/his comprehension and comparison of the two stories. Looking into the "stereoscopically anthropomorphised" counterpart, the spectator is invited not only to independently interrogate which version of the two is authentic in terms of the Bengal tiger's existence, but also to pay immediate attention to the true nature and ontological existence of the 3D field screen itself. Thereby the spectator instinctively rethinks her/his own subjective existence by projecting her/his own *self* onto the 3D screen, transposing the identifiable roles with the subjectivities both inside the story world (i.e. the film diegesis) and outside it (i.e. the film *itself* as a framed view, regardless of narrative context). It is thus that the distinct trans-subjective narrative perspectives complicate the intersubjective and intrasubjective relationship between the spectator and the 3D film dialogically.

The stereoscopic devices used in *The Great Gatsby* conform with similar tactics employed in *Life of Pi*. In particular, the emergence effect in the negative parallax space is designed with restrained depth budget primarily for underlining Nick's double-status subjective narrative perspective via the overtly accentuated

CGed subtitle graphics. There are other examples of imagery entering the negative parallax space in *The Great Gatsby*, although this is particularly striking. It is also extremely effective in underlining Nick's perspective on the narrative. By shooting their films in the 3D format and articulating the dichotomy of differing "within" and "without" bidirectional narrative perspectives, Ang Lee and Baz Luhrmann visually and phenomenologically scale up the film's diegetic scope in terms of narrative multiplicity and thematic profundity. Furthermore, the trans-subjective narrative perspectives adopted in their works highlight the subjectivity of both the spectator and the 3D field screen by foregrounding the intersubjective and intrasubjective relationship between the dual viewing subjects. Importantly, the negative parallax is used in a measured and focused way in these films, underlining the dominance of the Aesthetics of Recession in contemporary 3D cinema. Indeed, it is the Aesthetics of Recession that provide the primary dramatic spaces in relation to which narrative perspectives are articulated.

### **Conclusion**

Based on the stereoscopic imagery traits derived from its uniquely configured two-camera mechanism, the 3D field screen with dual spatiality tends to take the viewer into both the positive parallax and negative parallax spaces, rather than closing the viewer off from the event she/he is witnessing on the traditional 2D screen. The 2D screen resembles a painting canvas in which linear perspective provides a single point of view with the best vision from the viewer's vantage point, whereas the 3D field screen, which is much less dependent on linear perspective, can position spectators in the centre of the illusory events, thus making them feel involved and even immersed in the diegesis. Consequently, the viewer becomes part of the depicted events through an avatar of the "invisible observer" across the 3D field screen. As well, the "invisible observer" may bring character subjects out to the audience space. Due to this bidirectional crossover around the 3D field screen, various forms of characteristic trans-subjective narrative perspectives exclusive to stereoscopic 3D cinema push the boundaries of cinematic storytelling by distributing subjectivity across onscreen and off-screen spaces.

Eventually, 3D film not only, as Sobchack suggests with regard to 2D, "actualizes and realizes its ability to localize, unify (or 'center') the 'invisible' intrasubjective exchange or commutation between the perception of the camera and

the expression of the projector” and “makes this exchange visible and intersubjectively available” to the spectator “in the expression of its perception” (22). It also expands the scope of this exchange and connects it, more or less overtly, to the narrational figure of the invisible observer. In so doing, it adds narrational complexity and makes possible new visual configurations of first-person and third-person narrative perspectives. At the same time, it forcefully emphasises the spectator’s status as “being-viewing subject” and “being-viewed object”, thus adding fresh layers of complexity to the Aesthetics of Recession for the 3D cinematic spectator.

## Chapter 6: Between Depth and Flatness: Shaping Stereoscopic Ontologies

If the visual distinctions between 2D and 3D imagery were underlined in the previous chapters, this chapter will be focused on how 2D and 3D elements can be combined to produce ontological effects. In certain 3D films, entire scenes or selected objects and environments are subjected to a kind of “artificial flatness”, appearing to exist in 2D. In this way, “artificial flatness” coexists with “virtual depth”. Of course, 3D films are already replete with techniques carried over from 2D cinema. When we discuss 3D cinema’s ability to “redeem” (volumetric) reality, the orchestration of spectacle and narrative, and the augmented visual subjectivity produced by 3D imagery, we tend to linger on the positive parallax and negative parallax spaces, and the consequential amplification of Z-axis depth. However, without the contrast provided by 2D cinematic techniques (including conventions regarding spatial composition), such arrangements in depth cannot be effectively accentuated. “Flatness” is thus an indispensable, though rarely overt, component contributing to 3D visuality. It arguably makes 3D techniques more intense and powerful by acting either as a stark antithesis, or symbiotic complement, to 3D’s “virtual depth”. However, certain 3D films render flatness more overtly, using it as a kind of textual device that signals the ontological properties of characters, settings and narrative worlds.

As we know, the 3D field screen comprises two imbalanced spatial volumes (the positive parallax and negative parallax) together with the planar 3D window (the zero parallax) that acts as a separation, and also a nexus, for the dual parallax spaces. The zero parallax in the 3D context defines flatness; by bringing images close to the zero parallax, 3D filmmakers can produce a kind of “artificial flatness,” as opposed to the volumetric depth with which we typically associated 3D cinema. These uses of artificial flatness tend mainly to work according to the Aesthetics of Recession – the negative parallax is used only sparingly, placing emphasis on spatial environments (whether deep or flat) as zones for dramatic staging and interaction.

I will begin with a brief discussion of the *applications* and *modes* of artificial flatness in 3D cinema. Firstly, the narrative contribution of artificial flatness can be separated into four typical *applications*. Artificial flatness can be used to: 1.

distinguish and shape action and emotional sequences; 2. mark narrational shifts into the temporal past and present; 3. signal transitions between different narrative environments or “story worlds” (reality or fantasy); 4. produce contrasts between different characters (i.e. “flat” vs. “rounded” characters). These four narrative contributions of “artificial flatness” are all based on the coexistence of depth and flatness as components of 3D visuality, but they are distinguished by their overt foregrounding of flatness.

I will illustrate my discussion of flatness and depth mainly with 3D animation films made in recent years, including *Coraline* (2009), *Kung Fu Panda-2* (2011), *Wreck-It Ralph* (2012), and *Big Hero 6* (2014). Because animation films (both analogue and digital, 2D and 3D) are less committed to the replication of “photorealistic” spaces and characters than live-action films, they have been able to foreground the fluidity between artificial flatness and virtual depth, while allowing narrative to play out across both sides of this divide. Furthermore, animation films have pioneered the current (and ongoing) 3D resurgence: following the release of Warner Bros.’ *Polar Express* (2004) and Walt Disney’s *Chicken Little* (2005) – both of which are fully computer-animated 3D films – most 3D features made in the following years were animation films<sup>27</sup>. Not until *Avatar*’s landmark global success in 2009 did a large number of 3D live-action films begin to emerge. Nowadays, the majority of mainstream digital animation movies produced by Hollywood Studios have adopted 3D.

Given digital animation’s simulation of virtual spaces that are already mapped in three dimensions, it has become a natural home for stereoscopic imagery (by contrast, *Chicken Little* involved a complete conversion from 2D to 3D)<sup>28</sup>.

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<sup>27</sup> The Wikipedia list of worldwide 3D films made since 2005 only gives a rough sense of the global entirety of 3D productions in all genres so far. There may be 3D films made in other nations left out of the list. But major Hollywood 3D productions since then are all on the list. If we look into the 3D feature films made between 2005 and 2009 (the year of *Avatar*’s sweeping success worldwide), the majority of them are 3D animations, plus a few low-budget live-action slashers. Retrieved 26 March 2015. [http://en.wikipedia.org/wiki/List\\_of\\_3D\\_films](http://en.wikipedia.org/wiki/List_of_3D_films).

<sup>28</sup> Robert Neuman, Stereoscopic Supervisor of *Bolt 3D* (2008) and *Big Hero 6* (2014), writes: “*Chicken Little* was done as a post conversion of the monoscopic film through an outside vendor... Little attempt was made to make creative use of the stereoscopic depth. The primary goal in this process was to provide a comfortable viewing experience for the audience, and toward this end, the dynamic range of the parallax was clamped at very conservative limits.” in “*Bolt 3D: A Case Study*”, *Stereoscopic Displays and Applications XX*. 2009. DOI: 10.1117/12.823927. Retrieved 28 November 2015: <https://michaelscroggins.files.wordpress.com/2013/12/16427434.pdf>.

Reflecting on the aesthetic strategies in Disney's digital 3D animations, stereoscopic supervisor Robert Neuman ("*Bolt 3D*") proposes that the applied philosophy of depth for storytelling became more sophisticated between the production of *Chicken Little* and *Meet the Robinsons* (2007) and that of the subsequent Disney release *Bolt 3D* (2008). By comparing his 3D strategies applied in *Bolt 3D* and the most recent work *Big Hero 6* (2014), we can see that his approaches to handling depth/flatness for narratives have continued to change markedly over the years, particularly in the utilisation of flatness for the "emotional big moments" (a technique that runs counter to his earlier depth philosophy). Bringing artificial flatness back into contrast with virtual depth for innovative storytelling is not only an overt phenomenon in recent 3D animation productions; the strategy has also been adopted in more and more 3D live-action films. So, two stylised live-action 3D films, *Hugo* (2011) and *Sin City: A Dame to Kill For* (2014), will be also discussed for their distinctive manipulation of artificial flatness and virtual depth, and the narrative effects they produce.

### **The Ontological Symbiosis of Virtual Depth and Artificial Flatness in 3D Visuality**

To define "virtual depth" and "artificial flatness" in the 3D context, I will shortly return to the ontological metaphor for 3D visuality we discussed in Chapter 2 – a transparent and scalable oval sphere with imbalanced spatial duality (the positive parallax and negative parallax) divided by the planar 3D window (the zero parallax). First of all, the imbalanced two-volume spatiality in 3D imagery that renders conspicuous depth along the Z-axis is a mechanically induced illusion produced by the two-camera apparatus. This virtual spatial duality (the negative and positive parallax) is either captured by a real two-camera rig, as in most 3D live-action filmmaking, or simulated by a virtual two-camera configuration in 3D animation productions. Although the negative parallax space in front of the 3D window and the positive parallax space behind the 3D window are utilised frequently in 3D filmmaking, the zero parallax 3D window, which projects a transparent and planar surface inserted inside the dual-volume oval sphere, is also useful. In order to produce certain effects, imagery in the negative and positive parallaxes is often "squeezed" towards the zero parallax to varying degrees and at different moments.

The extreme case is when both parallax spaces are pressed exceedingly proximate to but not overlapping with the zero parallax 3D window. Here, 3D's illusory depth transforms into an "artificial flatness", or "flattened depth", contrasting with the typical emphasis on spatial volume. The transparent oval sphere now has shrunk drastically to become a transparent 'magnifier' with only slight bulge on each side. Therefore, both artificial flatness and virtual depth are organic constituents of a symbiotic coexistence that constitutes the visual ontology of 3D cinema. Although flatness and depth represent two different modalities of the cinematic world, they can coexist in 3D, contrasting with each other or transforming from one to the other in flexible and fluid ways. Artificial flatness is an intrinsic element of 3D, which diversifies and enriches the aesthetic and narrative scope of stereoscopic cinema. The symbiotic coexistence of artificial flatness and virtual depth is demonstrated by an array of contemporary digital 3D animations and stylised 3D live-action films, in which flatness and depth, whether complementary or contrasting, are both unleashed, revealing their potential for supporting and developing narrative effects.

I will now investigate the distinctive properties of digital 3D cinema's ontological symbiosis of artificial flatness and virtual depth through the approach of digital topology. James Peters sheds some light on this approach via the study of digital image processing within *proximity spaces* (a topological term for spaces defined by of "nearness") –

Digital topology focuses on the properties and features of 2D and 3D digital images that correspond to topological properties such as connectedness, nearness (proximity of points and sets), remoteness and topological features such as boundaries, coarse (large) granularities vs. fine (small) granularities. In digital topology, the basic approach is to segment an image into parts and measure various properties and relationships among the parts... (261)

In other words, digital topology is concerned with the spatial interrelationships and arrangements, the connectedness and separateness of visual components, and the properties of movement and speed that dynamise the interactive relationships among these visual components. While topology focuses on the spatial relationships among visual components, topography is pertinent to the study of the surface shape and appearance features of visual objects. Nonetheless, very little research into either

topology or topography has so far covered the properties of digital 3D imagery in relation to cinematic storytelling. I argue that 3D's ontological symbiosis of depth and flatness can be explored via topological and topographical analyses of the movements and interactions of 3D spaces, patterns and objects.

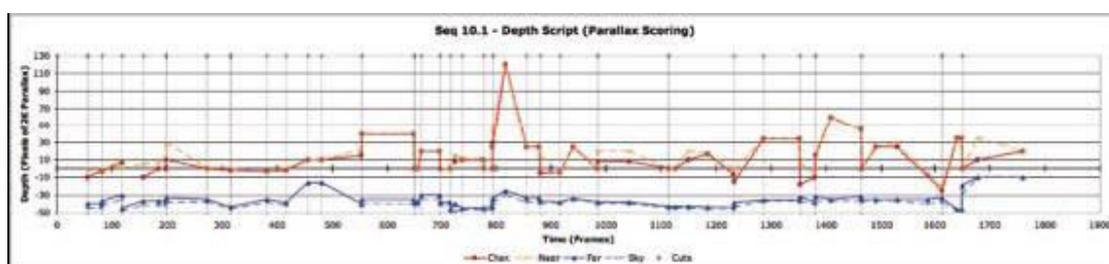
Among the few writers that apply topology and topography to analyse digital animation films, Jeff Malpas has argued for the significance of the "animated surface": "[T]he surface takes on a special significance – no less in 3-D animation than in more traditional forms. If we take seriously the idea that animation is a matter of the making-move of the image or figure, then animation is not a making move of what lies beneath the surface, but a making move that is evident in and through the movement *of surfaces*" (74). Although Malpas's comments could arguably apply to other media formats, the process of "making move in and through the movement *of surfaces*" is indeed more flexible and seamless in digital 3D animations than in 3D live-action films, because the vast majority of the former are made in the environment of computer-generated, completely 3D, virtual spaces. Certainly, this "animated surface" generated in computer space may be topologically curved or flat.

On the other hand, it is possible to see a very real sense of depth (as opposed to surface) in digital imagery: the virtual depth along the Z-axis in computer space is not merely a surface effect but exists in (mathematical) space. Contradictory to Malpas's emphasis of surface, Stephen Prince contests:

The Z-axis in computer space is very real. In conventional cinema, it exists at the point of filming but then, when encoded as a 2D display, it vanishes except for the ways that monocular depth cues point to it. Encoding characters and settings created in computer space for stereoscopic display maximizes the perceptual information that has already been built into them, rather than discarding that information as happens when porting the film or sequence to a 2D display mode. (*Digital Visual Effects* 218-9)

This contradiction between topological depth and topographical surface (whether flat or curved) in 3D animation requires a proper understanding of how this contrastive and symbiotic pair work together and what narrative potential the conjunction of virtual depth and artificial surface can offer. I will explore this narrative potential by

analysing the interplay between animated characters and objects, their actions and movements in and through the “intricate surfaces” underpinned by algorithmic manipulation and computational thinking (Wing, “Computational Thinking” 35). Conceptualising via the computer requires “thinking at multiple levels of abstraction”, because its formal foundations rest on mathematics. As Jeannette Wing states: “Being free to build virtual worlds enables us to engineer systems beyond the physical world” (35); but the pictorial outputs of cinema based on such ‘freedom’ still require a vivid and direct measurement, which should be compatible with and reflective of the narrative rhythm and emotional ups and downs of the story. As Neuman states: “The commitment to using stereoscopic depth as a storytelling tool dictated that there must be a consistent plan for the application of depth that somehow would mirror the narrative content of the film, a depth score, analogous to a musical score in how it is orchestrated to reflect the emotional content over time” (“*Bolt 3D*”). A “depth score” lays out the overall undulating depth shape “to show where every major element is in space, relative to each other, and to the screen” (Gardner, “Perception and The Art”)<sup>29</sup>. The depth score is usually illustrated via the so-called “depth script”.



**Figure 6.1** A depth script example created by stereographer Brian Gardner

The depth script (or parallax scoring) refers to the structural arc of stereoscopy for the entire story of a film, which is responsive to and based on the narrative arc of the narrative structure of a film. Those narrative ups-and-downs, rhythmic changes, and emotional bottoms and peaks, in a 3D film, can all be indicatively modulated via the appropriate “depth budget”, shot by shot, scene by scene, as mapped out in the film’s depth script. Depth budget (or parallax range) is a term for measuring the amount of stereoscopic depth in a 3D image, and it is one of the key criteria for assuring audience comfort. It is usually marked as a percentage, which limits the maximum depth amount recommended for both negative and positive

<sup>29</sup> See “Perception and The Art of 3D Storytelling” written by Brian Gardner. Web. Retrieved 29 April 2015. [https://library.creativecow.net/gardner\\_brian/magazine\\_3d\\_storytelling/1](https://library.creativecow.net/gardner_brian/magazine_3d_storytelling/1). The two illustrations of depth script example used in this chapter are also cited from this article.

parallax throughout a 3D film. The depth budgets can be different in front of and behind the 3D screen.

If the depth script indicates the overview “curve” of the intensity of 3D depth showing the depth score composed across the whole film, depth budget is a guideline, or a limit for filmmakers to comply with, for each single shot, in order to ensure audience comfort throughout the entire film. Referring to the depth budget in *Bolt 3D*, Neuman writes:

Our limits for negative parallax were far more lenient due to the relatively minor discomfort associated with vergence-accommodation discrepancy compared to that caused by the divergent lines of sight forced by having a large disparity in the positive parallax region. Acknowledging the temporal nature of these effects, we attempted to utilize higher disparities for shorter periods of time. (“*Bolt 3D*”)

Neuman’s carefully modulated approach to depth budget in *Bolt 3D* is completely different from the evenly set depth budget used in *Chicken Little*, regulated by fixed interaxial settings or default parallax limits. Revealing the significance of depth as a storytelling tool, Neuman further elaborates: “Toward this end our depth score was useful, since it assigned depth according to emotional impact, thus reserving the greater depths for the big moments in the film and letting the audience rest their eyes a bit in between” (“*Bolt 3D*”). In conjunction with this strategy of “greater depths” for the emotional “big moments”, Neuman uses another strategic measure – dynamic depth range, which he refers to as “the gamut within the camera frustum from small, very close elements to distant, very large elements” (“*Bolt 3D*”). This solid portion along Z-axis space allows the filmmaker to adjust the “rapidly swinging” depth budget. “Our method of balancing the depth budget is to borrow depth from the negative parallax region, where comfortable depth is more plentiful, by shifting the entire scene forward stereoscopically” (Neuman “*Bolt 3D*”). The 3D philosophy applied in *Bolt 3D* was thus defined by “greater depths” for emotional “big moments”, but also the use of “dynamic depth range” which shifts the span of available 3D space back and forth along the Z-axis.

However, six years later, in *Big Hero 6* (2014), Neuman subverts nearly all of the principles he applied to *Bolt 3D* (2008). Not only does he use the positive parallax for the spacious “dynamic depth range” in most action sequences, but he also reverses the doctrine of “greater depths” for emotional “big moments” by contrarily “flattening” the depth budgets to near zero 2D level for the emotional climactic scenes. These two major strategic shifts are absolutely contradictory to his previous approach in *Bolt 3D*; they nevertheless adhere to his persistent artistic belief: “Art is the filtering of reality. It is characterized more by what is left out rather than what is put in. A controlled rather than random usage of a technique is what allows it to convey meaning and support the narrative of the film” (Neuman “*Bolt 3D*”). “Controlled usage of a technique” in *Big Hero 6* means that depth must sometimes yield to artificial flatness for both narrative and thematic aims. Deliberately integrating artificial flatness into the narrative tactics thus allows the “emotional big moments” to play out themselves, because strategically “leaving out” virtual depth focuses the audience’s attention on the story. Amalgamating with shallow focus on the characters in the foreground, the controlled flattening depth directs the audience to concentrate on the character expressions and affections in those climactic scenes thus highlighting the emotional climaxes.

On one hand, the deployment of flatness alongside other cinematic techniques such as shallow focus, close-up, and shot/reverse shot device works to support the narrative. On the other hand, the artificial flatness of the characters’ facial close-ups may pose a profoundly ontological significance beyond the mere epistemological concerns of the characters themselves. Describing the flat visual mode in *Wreck-It Ralph*, Miriam Ross writes that “...we are shown an old visual mode – flat, basic two-dimensional computer graphics – within a new, more developed visual world – stereoscopic, advanced 3D computer graphics. Yet, soon after, the pixilated world fills the screen space, giving the flat representation its own ontological significance” (*3D Cinema* 184-5). Here, the movement between flatness and depth is a movement between different media-worlds. Yet as I suggested earlier, there are a number of other ways in which flatness and depth can be counterposed. For example, juxtaposed with volumetrically rounded characters, artificially flattened characters produce ontologically heterogeneous characterisations which establish contrasts such as between protagonist and antagonist, moral and immoral, powerful

and weak, and so on. The ontological symbiosis of depth and flatness can also be used to differentiate between the fantasy world and real world by juxtaposing or morphing between the two statuses. These various strategies can, in a broader sense, contribute to 3D films' themes and narrative articulations.

The overt shifting between depth and flatness has become a creative trend for storytelling in more and more 3D films produced in recent years. Especially in digital 3D animations, virtual spaces and animated characters can be seamlessly integrated, giving filmmakers additional opportunities to experiment with the peculiar fusion of topological depth and topographical surface (either curved or flat). As a result, the properties of 3D digital cinema can be explored via the topological relations between characters and objects along the Z-axis (as well as the X and Y-axis), such as connectedness and disconnectedness, closeness and remoteness, and so forth.

In the following sections, I will consider the narrative implications of such an approach by discussing selected film examples categorised according to four *modes* of “artificial flatness”, namely, *remediation*, *juxtaposition*, *morph*, and *synthesis*. The reason for structuring the discussion in this way is that it allows me to compare various types of “artificial flatness” in terms of their ontological implications and narrative purposes. Importantly, these four modes of “artificial flatness” do not necessarily correspond directly to the four applications I suggested earlier (distinguishing and shaping action and emotion, marking temporal transitions, marking ontological transitions, and establishing character attributes). For example, two different modes of “artificial flatness” may elicit the same narrative effect; at the same time, a single mode may fulfill more than one aesthetic purpose. In short, my categories serve primarily to mark the formal relationships between flatness and depth, whether temporal (from abrupt changes to gradual shifts) or spatial (from clear delineation to synthetic integration). These relationships, I argue, have been exploited by filmmakers in order to generate both narrative effects and ontological distinctions.

### ***Remediation***

The first mode of stereoscopic symbiosis between depth and flatness is *remediation*. Broadly speaking, remediation involves the incorporation or representation of one medium in another medium. In the context of my discussion, then, remediation refers to the depiction of 2D media (including film clips and video interfaces) within 3D

films. Discussing the properties of new media, Jay Bolter and Richard Grusin asserts: "...we may think of something like a historical progression of newer media remediating older ones and in particular of digital media remediating their predecessors. But...older media can also remediate newer ones" (55). In this respect, digital 3D cinema is a complex case. Stereoscopy was actually invented nearly half a century prior to cinema, so in a strict sense is an older medium. However, 3D cinema in its present form can be considered a newer medium than 2D cinema, whether celluloid or digital. Bolter and Grusin go on to state: "Finally, just as there is nothing prior to the act of mediation, there is also a sense in which all mediation remediates the real. Mediation is the remediation of reality because media themselves are real and because the experience of media is the subject of remediation" (59). My discussion of *2D remediation* in this section will be based on this sense of the bidirectional relationship between new and old media, and the experience of media as the subject of remediation. All the sequences I will discuss are intentionally remediated 2D media experiences represented in 3D films.

Remediated 2D insertions in 3D films often appear in black and white format, and are shown on screens (cinematic, televisual, or digital) within the diegesis. Such remediated sequences are often very short. In *Hugo*, for example, we see several screenings of the Lumière brothers' early films, *Workers Leaving the Lumiere Factory*, *Arrival of a Train at a Station*, and Georges Méliès's classic silent film *A Trip to the Moon* (1902) clips. In *Up* (2009), a fabricated 2D newsreel "Movietown news" is shown (screened in cinema) as the film's opening scene. Some remediated insertions are just as brief as several seconds. In the opening sequence of *Chicken Little* (2005), two shots of the 2D film *Indiana Jones* (1981) are shown in a theatre; and a faked film noir scene is broadcast on a TV screen in *Sin City: A Dame to Kill For* (2014)<sup>30</sup>. Both clips comprise two brief shots and only take a few seconds. A more distinctive case of remediation is provided by the occasional 2D sequences that appear on a black and white DV camera display in *Resident Evil: Afterlife* (2010), as the female protagonist, Alice, speaks directly into the recording camera. Each of

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<sup>30</sup> In the special feature on the DVD of *Sin City: A Dame to Kill For*: a 15-minute fast-forwarded version of the film, from about 13'17" to 13'20", shows the scene is constructed by two actors dressed in detective coats and hats performing in the green room, with boom in the frame to pick up their dialogue shown from upon an analogue TV set, which is surrounded by alcohol bottles and Nancy's personal belongings. The two actors look very much like Frank Miller and Robert Rodriguez, respectively, the film's two directors.

these remediated 2D display segments takes between twenty to thirty seconds. While many remediated insertions are in black and white, two exceptions are in colour: the above mentioned two shots of *Indiana Jones* shown in *Chicken Little*, and the classic “finger-burn” scene in *Lawrence of Arabia* (1962) screened on a huge indoor digital screen in *Prometheus* (2012). In *Hugo*, among the majority of black-and-white early film segments, two excerpts of *A Trip to the Moon* are shown partially in black-and-white and partially in hand-tinted colours. In addition, most remediated insertions are completely in original 2D flat format. One notable exception is the climactic theatrical screening of *A Trip to the Moon* clip in *Hugo*, in which 3D is added; another is the first shot of the *Lawrence of Arabia* segment in *Prometheus*, which is screened in an establishing long shot in the deep background with obvious depth, and the deep-focus configuration amplifies the depth of this inserted footage.

In some films, the 2D insertion only emerges once: in both *Chicken Little* and *Up*, instances of *2D remediation* appear in the opening scene and then never show up again. In *Prometheus*, the remediation of *Lawrence of Arabia* arrives in the early stage of the second act, while in *Sin City: A Dame to Kill For*, the brief remediated insertion breaks in much later during the final act. In other cases, remediated 2D insertions arise multiple times within a certain period of the narrative structure. For example, the flattened camera display insertions are distributed across the first half an hour of *Resident Evil: Afterlife*, while most of the early silent film insertions in *Hugo* occur during the second half of the film. In these latter two cases, *2D remediation* contributes to narrative structure by acting to punctuate the story at intermittent points.

Despite these diverse approaches, all these 2D remediated insertions integrate seamlessly with storytelling, although not all of them undertake essential narrative functions. The contrast produced by these insertions of flatness adds a self-reflexive element to the films, foregrounding the presence of 3D by flaunting its absence. This is especially the case in *Hugo*, in which the 3D clips of *A Trip to the Moon* contrast with the 2D clips apparent elsewhere in the film. These *2D remediated insertions* in *Hugo* also play an important narrative role by motivating the protagonists to interact with each other in plot point scenes, hence driving the narrative forward in the second half of the film and serving to outline its underlying

structure. Similarly, in the opening scene in *Up*, the protagonist, Carl Fredrickson, seen as a young kid, watches newsreels in a cinema. The over a minute long 2D insertion, titled “Movietown news”, not only succinctly introduces the historical background of the story, but also foreshadows the crucial narrative elements that drive the plot forward later in the film.

First of all, the sequence called “*Spotlight on Adventure*” in *South America* describes the disgraced famous explorer Charles F. Muntz, who has been accused of faking the skeleton of a giant bird that he claims to have found in Paradise Falls; Muntz swears that he will go back and catch a live one. The remediated black-and-white flat newsreels (shown in the Academy 1.33:1 ratio) mark the scene as taking place in the past, and foreshadow the reappearance of Muntz as a crucial character later in the film. In any case, Muntz becomes a key factor for Carl when he befriends the girl Ellie, who will later marry him, because both of them are admirers of Muntz. More importantly, it is Ellie’s unfulfilled dream of travelling to South America that prompts Carl to take the adventurous trip after her death. He does this by turning his house, which is being forced to sell, into an airship held aloft by thousands of helium balloons. Later, as Carl and his accidental companion, a young boy named Russell, nears Paradise Falls, Muntz’s surprising reappearance constitutes the midpoint of the film and pushes the story in a completely different direction. As the sole antagonist of the film, Muntz’s reappearance and later deeds are responsible for all the conflict and dramatic tensions in the second half of the story. All of these substantial narrative developments can be traced to the 2D remediated newsreel which begins the film; it foreshadows the development of character relations, the plot progression, and the dramatic climax of the film. In this case, the contrast between the flatness of the opening (where Carl admires Muntz) and the depth of the later scenes (where Carl sees through and fights Muntz) helps to mark Carl’s loss of innocence: Muntz’s legendary status is revealed to be merely a two-dimensional sham. In this way, the flat 2D *remediation* also reveals the flatness in 3D visuality, as opposed to its more obvious manifestations of virtual depth. However, flatness and depth in 3D are not always opposed to one another. One accommodates the other quite harmoniously in Martin Scorsese’s *Hugo* (2012), for example.

Martin Scorsese's first 3D foray *Hugo* is a self-reflexive film about early cinema and cinematic technology, and serves as a retrospective portrait of early silent film history. There are four brief silent film-screening scenes, intercut with audience reactions, throughout the film. The first *remediation* comes in about 40 minutes after the film begins, in the scene in which Hugo and Isabelle "take an adventure" and sneak into a cinema, seeing a sequence of Harold Lloyd's 1923 silent comedy, *Safety Last*. About forty seconds later, they are dragged out of the cinema by the manager. But they are so fascinated by the novel cinematic viewing experience that they have a conversation all about cinema in the following scene, getting to know each other much better in the process. Hence, this cinema-viewing scene, dominated by *2D remediation* of the silent comedy film, integral to the relationship development of the two characters, prompting them to get closer based on their mutual interest in cinema. This closer relationship paves the way for their later visit to the library and the surprising discovery of the secret of "Papa George". Thus, the importance of this first *2D remediation* is significant not only in relation to the evolution of their relationship but also in relation to the narrative structure more generally.

Similarly, the second remediated 2D insertion happens at around 70 minutes, when the two kids visit the Film Academy library and read the book *The Invention of Dreams* written by film scholar Rene Tabard. A potpourri of early silent film clips is intercut with the film stills in the book and the kids' curious and fascinated close-ups. Among the series of 2D clips, the last is the trademark shot of the space shuttle "poking" into one of the moon's eyes in Georges Méliès's *A Trip to the Moon*, which draws the attention of the book author Rene Tabard. This is the first appearance of Tabard, who becomes a very crucial character driving the story. Therefore, the inserted *2D remediation* of silent films is important for narrative progression, because it introduces this character. His further interaction with the two kids eventually leads to the final revelation of the mystery of Georges Méliès.

The third *2D remediation* occurs at around 90 minutes and takes about one and half minutes: it is the scene in which Tabard screens *A Trip to the Moon* to Hugo, Isabelle and Mrs. Méliès at Méliès's home. The scene is a key plot point, leading to the resolution of the three-act narrative structure, since it leads Papa Georges to reveal himself as the filmmaker Méliès and tell his life story. Then, a one minute long final

screening of Méliès's films in the film's climatic scene is distinguished by the deployment of 3D. The last shot of the screening ends with the famous imagery of a rocket landing on the moon in *A Trip to the Moon*. This imagery occupies the deep plane of the positive parallax space, while the audience sits in the negative parallax space, watching the screen. The moon gradually moves forward towards the audience; after the space shuttle pokes into one of the moon's eyes, the moon continues moving forward and emerges into the audience space, and then it stops and shares the space with both the audience in the film and the audience of the film.

Comparing the topological properties of the climatic screening's 3D version and 2D version, one notes some marked differences affecting the spatial relationships between the characters, relative proximity of the depicted cinema screen, and the connectedness/disconnectedness of the screen and the audience within the film. Overall, the volumetric depth in the 3D version creates stronger topological relationalities, brings up more connectedness, and further gives rise to more intimacy among the real audience, the diegetic audience and the screen within/of the film. Especially in the final shot of the screening, the moon's presence in the negative parallax affects our sense of both the real and diegetic audience's proximity to it, because the real audience and diegetic audience share the same space and look more connected to each other, and also more connected to their viewing objects: the moon and the screen. This connectedness makes the real audience feel not only more intimate and engaged with the remediated imagery but also more closely identified with the affective experience of the diegetic audience. In the 2D version, however, there is not a commonly shared visual zone between the moon and the audience (both in the film and of the film) to nurture such intimacy and empathy.

By comparison, the viewing experience for this final 3D *remediation* of Méliès's original film clips is strikingly distinct from the previous insertions, which show his films in 2D. The two patterns of viewing are governed by two sets of fundamentally different visual rules that represent two forms of visual ontology. For a long time, Méliès's films were regarded primarily as magical tricks relying on early cinematic techniques and devices borrowed from magic performance, because Méliès himself was a magician before being lured into filmmaking. Similarly, 3D technology has been long regarded as a visual trick, lacking serious aesthetic values. However, A

*Trip to the Moon* is widely recognised as a silent film masterpiece that exerts a range of cinematic techniques to engage in sophisticated visual storytelling. Therefore, by applying 3D to a remediated insertion of Méliès's 2D films, *A Trip to the Moon*, Scorsese intentionally uses a "visual trick" to pay his homage to the pioneer filmmaker. In the process, he also makes an assertive statement that 3D can be utilised for good storytelling, and thus self-referentially makes the case for his own attempt at 3D filmmaking. Méliès diverged into filmmaking from magic performance, now Scorsese diverges into 3D filmmaking from 2D filmmaking.

After all, the fascination of this self-reflexive climactic scene, which grants a novel viewing experience to the audience, is not simply produced by visual trickery, but works to establish a comparison with the earlier remediated sequences which show Méliès's films and other early silent film sequences in 2D. While the added depth to the final screening and other 3D devices supply Scorsese a large variety of possibilities to achieve his artistic storytelling, the flat *2D remediation* sequences are instrumental in constituting crucial plot points and contribute an essential contrast with the use of 3D in the climax scene. These scenes also help introduce key characters and advance their relationships, propelling the plot forward. Consequently, the ontological symbiosis of virtual depth and artificial flatness in 3D cinema is substantially affirmed and fully exploited by this virtuoso filmmaker, not only via his innovative visual storytelling, but also via his self-reflexive visual statement about 3D filmmaking.

### ***Juxtaposition***

The second mode involves the *juxtaposition* of 2D flatness and 3D depth. *Juxtaposition* can be used to underscore an emotional "big moment" by flattening the depth in certain scenes by contrast to prior and latter ones so as to direct the audience to concentrate on the film's emotional appeals; or it can be in a much shorter format, in which a 2D flat shot is juxtaposed between two 3D sequences. I will call the former form *sequential juxtaposition* and the latter one *abrupt juxtaposition*. A flashback scene from *Big Hero 6* (2014) will first be discussed to illustrate *sequential juxtaposition*; I will then analyse and compare two flattened scenes of old game worlds in *Wreck-It Ralph* (2012): in the first case, Turbo interrupts another game world; in the second one, Ralph works in the past *Fix-It Felix, Jr.* game. Both

examples allegorise digital 3D's self-reflexive developmental path. Finally, I will use an example from *Sin City: A Dame to Kill For* (2014) to examine *abrupt juxtaposition*.

The most common means of using artificial flatness to enhance “emotional dynamism” involves strategically manipulating the depth contrast between action/movement sequences and flattened emotional scenes, in which the depth budget is usually set to near 2D zero level, in concert with shallow focus on characters in the foreground. The flattened depth will direct the audience's attention to characters' facial expressions and emotions, especially in the “big moments” supplied by climactic scenes. Investigating *Dial M for Murder* (1953) and *Avatar* (2009), Miriam Ross finds that both draw upon aspects of 2D cinema. As she comments:

3D films, including *Avatar* and *Dial M for Murder*, utilise aesthetic strategies that are apparent in a range of flat cinematic forms. At times they present objects in deep space and at other times they draw attention to their textured qualities. They engage the viewer's body in their configuration of space and invite oscillation between the awareness of presence and non-presence in their optical field. (*3D Cinema* 46)

Although Ross does not directly discuss deliberate flatness in the 3D context, she points out that traditional 2D devices can draw the audience's attention to 3D films' “textured qualities” and the “non-presence” of their body in the “configuration of space”. This, in turn, can lead the audience to concentrate more on the diegetic world. The examples I discuss here deliberately set depth against flatness, drawing the audience into scenes via techniques that might seem more at home in conventional 2D cinema.

In the Oscar-winning animation film, *Big Hero 6*, the first flashback is a series of clips of antagonist Hiro Hamada's older brother Tadashi, who has died in a fire accident, running tests tirelessly on his healthcare robot Baymax. These clips are shown via an internal screen embedded in Baymax's chest. By showing the clips, Baymax hopes to convince Hiro that Tadashi's intention in inventing him (i.e. Baymax) was not to destroy (as Hiro has an impulse to do), but to cure, people. The

scene featuring these retrospective clips follows an intense fighting scene in which the furious Hiro orders Baymax to kill Professor Callaghan because he is revealed as the masked villain and admits that it is he who stole Hiro's microbots and left Tadashi in the fire to die. Contrasting with the large "dynamic depth range" of the fighting scene, in this interior scene in Hiro's loft, the depth dramatically shrinks after the first establishing long shot. Taking off the 3D glasses to view the entire scene, one sees little noticeable ghosting throughout, which means that the depth budget for the scene is very low and has been flattened to near 2D level.

In a stylised frame-in-frame sequence, a series of medium close-ups featuring shallow focus, desaturated colors, and overtly flattened depth show Tadashi directly looking into the camera and talking with Baymax (and also Hiro and the audience) while testing it. This example is, arguably, also an example of *remediation*, because of the use of Baymax's internal screen. However, the formal sense of remediation is mitigated here, since Tadashi's face on the screen is intercut with Hiro and Baymax's reaction shots, which are also rendered with little depth. Here, flatness is not just an artifact of mediation but is applied to other shots as well, in order to direct the audience's emotions and sympathies. Tadashi's accentuated expressions in the foreground change from being excited, frustrated, reinvigorated, tired...and finally to happy after more than a hundred tests. The viewers (and Hiro) are invited to become moved by his diverse emotional feelings and eventually by his success, supporting his efforts to invent Baymax in order to cure people in need. As one of a few emotional "big moment" scenes in *Big Hero 6*, the depth strategy in this scene has been radically adjusted by the same stereoscopic supervisor Robert Neuman, who would have customised "greater depth" for such a "big moment" scene six years previously in *Bolt 3D*. The different choices in *Bolt 3D* and *Big Hero 6* demonstrate the ways in which filmmakers like Neuman have constantly reevaluated the narrative potential of 3D technology over the years, adjusting their creative approach accordingly.

This artificially flattened "big moment" scene complies with an increasingly common strategy which uses flatness or reduced depth for emotional scenes while using enhanced depth for action and kinetic scenes. Such artificially flattened imagery can also work to define the temporal past by standing out from the depth-oriented continuum. By bringing out a volumetric contrast between the present and the past,

filmmakers can mark shifts in chronology. In *Big Hero 6*, the self-reflexive frame-in-frame format in the above scene (in which the close-up of the “past” Tadashi on Baymax’s present body screen) shows the archival footage completely flat while the present scene is endowed with a small amount of depth. In this way, artificial flatness diversifies filmmakers’ arsenal of stereoscopic narrative devices by integrating with other, depth-oriented techniques. This use of flatness to render pastness resembles the way that black-and-white has been often used in flashbacks to represent the temporal past, after colour film entrenched its dominance as the production norm.

In *Wreck-It Ralph*, a film set in the world of video games, older game worlds are rendered in flattened, desaturated, and pixelated fashion, contrasting with new game worlds’ depth, colour-saturation, and sharp visual quality (Ross, *3D Cinema* 183-6). Again, there are strong elements of remediation in such scenes, although I have incorporated them under juxtaposition, since the primary emphasis in each case is on narrative relations and contrasts rather than on highlighting mediation itself. Among the older game depictions, two comparatively long sections of *sequential juxtaposition* stand out conspicuously from the entire film. The first one is the opening retrospective sequence showing 20 years of the Fix-It Felix Jr. game history, narrated by Ralph, the hateful villain destroyer of the game, in a self-deprecating tone, foreshadowing his dislike for being a villain. The second section is around the midpoint of the film: in a flashback sequence, Felix Jr., who is looking for run-away Ralph, tells Sergeant Calhoun about how an outdated older game character, Turbo, has intruded into a newer racing game, destroying himself and the new racer character out of jealousy and anger. Following this flashback *juxtaposition*, Felix Jr. expresses his concern that Ralph might become Turbo somehow. In both cases, the emphasis is building up plausible story worlds within the game. Although the “screen frame” of the game machine does appear in some shots, distancing us somewhat from the game, in other shots the “flattening” effect is used to immerse us in the realm of old-school gaming.

Comparing Ralph and Turbo in the above two flattened *juxtaposition* sequences, we can see that they are both powerful and lethal destroyers. Even though the two *juxtaposition* sequences both retell the histories of the two characters, the flattened and desaturated form accentuates different tonal qualities in each case, thus

suggesting different attitudes and fates for the two characters. In Ralph's case, the flattened depth, the desaturation, and the pixelated roughness, along with his self-deprecating voiceover, underscore his boredom at playing as a long-time "destroyer", foreshadowing his future escape attempt. In Turbo's case, the same flattened, desaturated, and pixelated device, in concert with Turbo's career ups-and-downs and his final intrusion into another game, emphasises his sadness, jealousy, and out-of-control fury.

Here, I will suggest that Ralph and Turbo's scenes offer ways of thinking about 3D's place in cinema history. That is, each of them represents aspects of how 3D has been seen at different historical moments – in particular, its stereotyping as a powerful "terminator" of the "illusory story world". 3D's tendency to compete with or become alienated from other technologies is either like Turbo, resulting in self-destructive endgame, or like Ralph, resulting in tiresome and destructive boredom. But the destinies of Ralph and Turbo are completely different, as implied by these two flattened *juxtaposition* sequences, which highlight their different approaches when facing new challenges. This is also comparable to the stark difference of 3D's destinies in previous booms and the recent one. If Turbo represents 3D's previous "aberrational status" (Paul 322), 3D's contemporary status is more symbolised by Ralph, who, to escape the boredom, chooses a positive route to "win his medal", by collaborating with the glitch racer Vanellope, who allegorises digital technologies in the film. Miriam Ross notes that when "Vanellope begins to disintegrate – 'glitch' – at points in *Sugar Rush* we see a representation of her digital code, a materialisation of something that is otherwise unviewable" (*3D Cinema* 184). She is the only character in the film that is capable of this.

Indeed, Turbo and Ralph's representative distinctions are also manifested in the present *Sugar Rush* game: Turbo's thin and slick figure is more compatible with the flat and desaturated old game world; while Ralph is more "rounded" to fit the present game world with its depth, colour and visual richness. As Miriam Ross notes: "Ralph's gigantic hands take on an exaggerated colossal quality as their three-dimensional grandeur hangs in stereoscopic space" (*3D Cinema* 183). The disparity between Turbo and Ralph's present figures underlines their different destinies in the present game world, which is contrasted with the flattened and desaturated old game

worlds: incarnating himself as King Candy, Turbo tries hard to hinder Vanellope's participation in the kart race, resulting in another self-destructive endgame; while cooperating with Vanellope, Ralph transforms himself into a constructive hero in the *Sugar Rush* and then returns to the *Fix-It Felix, Jr.* game.

Therefore, Turbo and Ralph resemble the two different aspects of stereoscopy's past and present, and their starkly different destinies emerge via their interactions with other technologies. Although they both look flattened and desaturated in the above two *sequential juxtaposition* segments which represent older game worlds, their different interactions with Vanellope self-reflexively allegorise the complicated evolution of digital 3D, culminating in Ralph's journey towards redemption.

There is another type of *juxtaposition*, which is much shorter than such sequential 2D manifestations and only comprised of one or two quick 2D cut-ins, which can thus be called *abrupt juxtaposition*. For example, in the first sequence of *Sin City: A Dame to Kill For*, there is a very quick transition between 3D and a 2D shot. In 3D, Marv (Mickey Rourke) climbs upon the hood of a running police car and cracks its front window. The following shot is in 2D. It appears to be animated, and depicts Marv charging into the car and throwing out the two cops. Cutting back to 3D, the film next shows Marv in close-up holding the steering wheel and driving the police car. This is a typical example of *abrupt juxtaposition* between 2D and 3D, which is distinct from the earlier examples of *sequential juxtaposition*, and also from *2D remediation* (although an *abrupt juxtaposition* and a *2D remediation* insert may sometimes resemble each other). Both processes involve a three-segment structure, with a 3D-2D-3D pattern. The key difference between the two modes is that the 2D cut-in in an *abrupt juxtaposition* is not remediated material. The visual materials in an *abrupt juxtaposition* can be any flat imagery that is suddenly inserted into the flow of the film. In most cases, action and graphic continuity are maintained in spite of the shift between 2D and 3D.

The example described above depicts a key moment of violence via a long shot that is also rendered artificially flat. To a certain extent, this distances the audience from the violence (regardless of whether they have noticed the dimensional transition). Examined closely, the topological shift produced by the insertion of the

single 2D long shot in between the 3D shots makes the two types of viewing experience quite distinguishable. Although the 2D long shot contains the violent content, its planar status and shot scale make the characters appear disconnected from each other and the violence mitigates as it looks as if at a remote distance from the audience. This *abrupt juxtaposition* makes evident the ontological coexistence of artificial flatness and virtual depth in 3D visuality, which the filmmaker exploits to produce ontological distinctions at the narrative level.

### ***Morph***

The third mode involves *morphing* between 2D and 3D, a smooth transition between flatness and depth. Based on the transitional speed and intensity, this mode may be categorised into slow *morph* and fast *morph*. A slow *morph* often indicates the gradual shift between two kinds of narrative worlds, such as fantasy and reality in *Coraline* (2009), or the past game world and the present game world in *Wreck-It Ralph* (2012). In other cases, the reason for the shift may be purely stylistic. In another example from the third segment of *Sin City: A Dame to Kill For*, Dwight drives a car from the city outskirts to “Basin City” in a 2D long shot; then the depth is gradually added and increased. After the continuous shot quickly sweeps over a signpost reading “Basin City” in the fore plane, it completely morphs into a stereoscopic cityscape. This gradual transition from one scene to another does not involve any diegetic or temporal status change, neither from a fantasy world to a real world, nor from the present to the past, so its function remains nothing more than a stylistic scene transition. A fast *morph* later in the same segment of the film performs a similar function. Here, Dwight is beaten up in Eva’s mansion, and is hurled through the air. As he falls, the shot morphs into 2D and then morphs back to 3D quickly, as he lands on the street in front of his apartment, accompanied by his own voiceover, “A door to door service”. This fast *morph* between flatness and marks a scene transition, rather than signaling a change in diegetic or temporal status. Generally speaking, a slow *morph* is more likely to be used to distinguish between two diegetic worlds or two temporal domains.

Amplifying contrast between two diegetic worlds or two temporal stages in the diegesis while signaling a smooth transition, a *morph* between virtual depth and artificial flatness may achieve this transformation by working with other visual factors such as colour and lighting design. With virtual depth being increased, the fictitious

“fantasy world” in the imagination of characters looks usually much more attractive and wonderful than the boring real world, which is usually defined by artificial flatness. By contrast, the temporal past often appears depth-flattened and less colour-saturated; the temporal present becomes depth-abundant and colorful. Morphing virtual depth and artificial flatness can serve to make the transition smoothly maintain narrative fluidity. Meanwhile, the conspicuous contrast brought by the visual heterogeneity of the two worlds or stages crystallises the distinction between the two types of visuality, which are governed by two different sets of visual rules and two different types of viewing experiences. The coexistence of depth and flatness in 3D thus has great narrative potential.

In the stop-motion 3D animation film *Coraline*, an eleven-year-old girl, Coraline, finds a bizarrely idealised “Other World” for her to escape the disappointment of real life. In this “Other World”, Coraline meets a copy of her real parents, who claim to be her “Other Mother” and “Other Father”, and resemble her real parents except for their black-button eyes. Initially fascinated, Coraline soon finds herself falling into a prolonged ordeal, in which she must save three ghost children, who lost their eyes and lives to the sinister “Other Mother” after she sewed buttons over their eyes. With the help of a black cat, Coraline reunites with her own parents, who were earlier kidnapped by the “Other Mother” but cannot remember what happened. Later, the monstrous “Other Mother” chases Coraline into the real world to bring her back to the “Other World”; together with her friend Wybie, Coraline destroys the “Other Mother” and they dump her remains down a well.

Director Henry Selick uses flattened depth, less saturated color, and a dim lighting style for the “real world” where Coraline lives with her perpetually busy parents. On the other hand, Selick deliberately deepens the fantastical Other World where the “Other Mother” and “Other Father” reside, by increasing the depth budget and incorporating colour and dramatic lighting. The contrast between the two diegetic worlds is highlighted via the manipulation of depth and flatness. Cinematographer Pete Kozachik explains the principal 3D philosophy in *Coraline*:

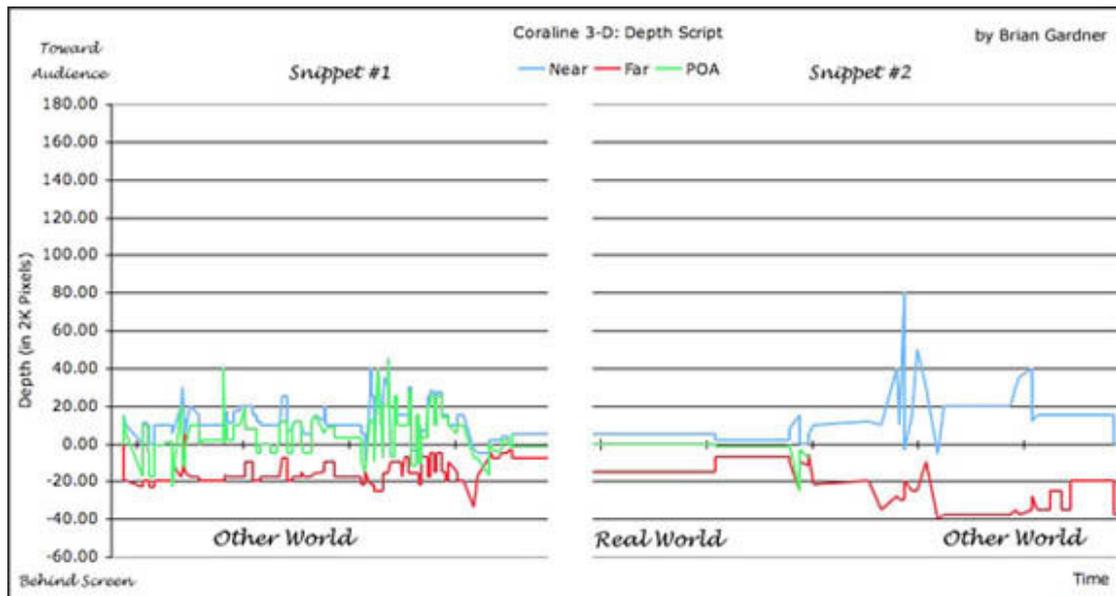
We all agreed 3-D had to be used to enhance story and mood, like any other photo technique...Henry wanted 3-D depth to differentiate the Real World from the Other World, specifically in sync with what Coraline is feeling. To do that,

we kept the Real World at a reduced stereo depth, suggesting Coraline's flat outlook, and used full 3-D in the Other World. At first, full 3-D opens up a better world for Coraline, but when things go bad, we carefully exaggerate stereo depth to match her distress. ("2 Worlds")

The resulting effect of the contrast between the flattened "Real World" and the exaggeratedly deepened "Other World" is prominent, as Scott Higgins observes, by comparing the contrast of Coraline's bedroom in the two different worlds:

In case the visual contrast between Coraline's worlds has so far failed to register, Selick reasserts it at the scene's end with a graphic match that dissolves between the two versions of the set. Coraline's Other World parents say good night as the camera tracks backward from the bed to a master shot of the room. Across the track, a dissolve to the Real World bedroom removes various set-decorations and shifts colors from warm reds and saturated blues to cold off-white and gray. Warm pools of light from on-screen sources give way to cool and soft indirect lighting, Coraline's parents vanish, and the volume and depth of the space contracts. (204)

In this slow *morph* process, although the depth budget for the Other World has not flattened to the 2D level, Kozachik admits operating "two sets of radically different physical depths" ("2 Worlds") for the two Worlds. His remark is supported by Prince's observation: "The drab reality she inhabits with her parents is pale, lacking vibrant hues, and is staged at or near a zero parallax region so that stereoscopy is reduced. The exciting and sinister world of Other Mother is rich in highly saturated color and lighting that alternates between warmth and threat" (Prince, *Digital Visual Effects* 215). The more depth-amplified Other World implies more radical topological changes, which match the narrative intensity and provide narrative environments for dramatic encounters between the characters and objects. Few dramatic events take place in the topographically planar Real World; however, it is still important to bring out the stark contrast to the Other World, and the *morph* via a slow dissolve from virtual depth to artificial flatness as a steady transition keeps the two diegetic worlds as a topological continuum.



**Figure 6.2** Depth script excerpts, respectively, for the Other World and the Real World in the 3D animation film *Coraline* (2012) designed by stereographer Brian Gardner.

Another good example of the slow *morphing* of flatness and depth defining the temporal past and present is from *Wreck-It Ralph*. In terms of the flatness and depth usage characteristics in *Wreck-It Ralph*, Miriam Ross observes:

stereoscopic depth is diminished in the depictions of older games such as Pac-Man, in which representation often becomes two-dimensional. In this way, stereoscopy is used as a tool to bring out certain depth qualities in the CG worlds, most obviously in the scenes in the arcade, as well as the Sugar Rush and Hero's Duty games, while its absence can emphasise flatness in others. (*3D Cinema* 183)

To achieve this goal, the filmmaker often uses a *juxtaposition* of depth and flatness, as I have explained in one of the previous sections, to directly bring up the comparison between the “heterogeneous visual fields” (182). However, for two comparatively long flashback sequences that take place in the older game “worlds”, a deliberate *morph* between flatness and depth is utilised to produce a fluid temporal transition between the present and the past, and vice versa.

The opening sequence that introduces the *Fix-It Felix* game world from twenty years ago is flattened and pixilated. The visual properties of this flattened old game are sluggishness, graininess, dullness, and a lack of topological interactions and connections between the objects (game characters); on the contrary, the visual

patterns for the following present-world arcade, in which kids are playing modern new games, are vivid, dynamic, colourful, and full of interplays and connectedness between the various figures, suggesting that this will be where the main narrative takes place. Although the visual contrast between the past and the present is conspicuous, the transition between them is gradual and very smooth. Firstly, the old game morphs into the new look as depth is increased, then the virtual camera tracks back to show the kids playing the new *Fix-It Felix* game, and ends by showing the entire video game arcade in obvious depth, accompanying the title “twenty years later”. The smooth, unbroken *morph* from flatness to depth confirms for the audience that the main narrative will be happening in the present day and the nostalgic old days have been left in the past, although a progressive association between the past and present is pictorially manifested. Therefore, the CGed long shot as a slow *morph* not only simply connects two scenes but also emphasises the passage of time between them. Thus, the ontological significance of the flattened opening scene is stressed as a temporal signifier; meanwhile, the connections and interactions between the past and the present are also demonstrated. Instead of merely highlighting temporal disjuncture, this smooth *morph* works to underline temporal continuity and transformation.

### ***Synthesis***

The fourth mode involves the *synthesis* of 2D flatness and 3D depth. Here, 2D elements are integrated seamlessly within 3D constructions. In other words, the fusion of flat appearances and volumetrically rounded objects within a virtually constructed stereo space (e.g. flattened characters in the 3D settings, or vice versa) embodies the ontological symbiosis of “virtual depth” and “artificial flatness” in 3D visuality. The multiple depth planes along the Z-axis can accommodate not only characters and objects with volumetric roundness but also intentionally flattened figures, allowing for emotional or kinetic interactions among them. On the other hand, a volumetrically rounded character can be placed among flattened surroundings. The most common instances of 2D and 3D *synthesis* are in opening or ending credit sequences. See, for example, the ending credits of *Coraline* (2009), *Boogie* (2009), *Wreck-It Ralph* (2012), *Life of Pi* (2012) and *Hugo* (2012), and the opening sequences in *The Adventures of Tintin* (2011), *Flying Sword of Dragon Gate* (2012), *Hansel and Gretel* (2012), *Sin City: A Dame to Kill For* (2014), and *300: Rise of an Empire* (2014). All

these credit sequences synthesise 2D and 3D figures together alongside 2D text, in either minimalistic or flamboyant patterns. In these title sequences, the flattened “surfaces” and the Z-axis “virtual depth” become peculiarly confluent with one another, emphasising the potential to bring together different visual “rules” within the same representational space.

Moreover, the simultaneous and spontaneous contradiction between flatness and depth can be used not only to portray antithetical characters, but also to produce thematic meanings by, for example, situating flattened characters against 3D backdrops, as with the “cardboard”-style character designs in *Boogie* (2009). In the live-action 3D film *Sin City: A Dame to Kill For* (2014), flattened figures sweep quickly across 3D surroundings in order to signal scene transitions as well as to conceal moments of visceral violence. In all the above cases, the accommodation of 2D flatness and 3D depth produces a kind of *ontological montage*, a type of “new montage” based on digital compositing, as introduced by Lev Manovich. Manovich uses two experimental films by Polish filmmaker Zbigniew Rybczynski to exemplify this montage method: “Works such as *Tango* and *Steps* develop what I will call an *ontological montage*: the coexistence of ontologically incompatible elements within the same time and space” (Manovich 70). Although Manovich’s examples of *ontological montage* are rarely seen avant-garde films, given digital compositing’s pervasive application in contemporary filmmaking, the concept of *ontological montage* appears in more and more popular commercial films.

Firstly, I would now like to analyse the *synthesis* of surface/artificial flatness and depth/volumetric roundness for characterization. Some of the distinctions marked out via this method include the good and the bad, the powerful and the weak, the complex and the straightforward. This use of visual analogues for character qualities can be understood by referring back to the famous British novelist E.M. Forster’s well-known remark about character dimensions. For Forster, “flat” characters are relatively uncomplicated and do not change throughout the story. By contrast, “round” characters are complex and develop through the course of the story; sometimes they are sufficiently changed to surprise the reader (Forster 47-55). Obviously, Forster is using “round” and “flat” in a metaphorical, rather than literal, sense to describe two types of characters. However, in 3D cinema this distinction

between “round” and “flat” characters can sometimes take on a literal dimension. Round characters can be granted more stereoscopic depth; on the other hand, reduced roundness can be used to describe flat characters. The relationship between flat characters and round characters can be given additional complexity (and pictorial heterogeneity) by the ontological coexistence of virtual depth and artificial flatness. The *synthesis* of pictorially flat and round characters, allowing them to interact within the same 3D settings, is one of the most powerful characterisation devices in digital 3D cinema.

For example, in Robert Zemeckis’s 3D animation film *Beowulf* (2007), he innovatively uses 3D distinguish between stronger and weaker characters by assigning different grades of roundness to them. As Prince observes: “In *Beowulf*...character roundness became a means for expressing power. More powerful characters, such as Beowulf, were given slightly more rounded volumes within shots than were weaker characters. Inter-axial spacing provided a means for achieving this” (212). By contrast, reduced roundness is associated with weaker characters. Because *Beowulf* was made in the early stages of the recent 3D resurgence, Zemeckis adopts a very conservative philosophy, so there is actually no “flattened” depth used for characterisation. Four years later, in Jennifer Yuh’s 3D animation film *Kung Fu Panda 2* (2011), flattened roundness in 3D settings is used emphatically to portray the antagonist (the peacock Lord Shen) in contrast to the much more rounded protagonist (Po the panda). This utilisation of depth/flatness to distinguish protagonist and antagonist exemplifies the ontological symbiosis of virtual depth and artificial flatness, by manipulating the volumes of both the 3D settings and the antithetical characters. The artificially flattened antagonist Shen can be inlaid seamlessly and move flexibly within the film’s depth-oriented environments, while the volumetrically rounded protagonist Panda Po can stand out against the slightly flattened background of Peace Valley. Moreover, as I will detail below, these two types of topological *synthesis* appear fluidly throughout the film. The interactions between the flat antagonist and rounded protagonist across the multiple topological planes thus substantiate the applicability of Manovich’s notion of “*ontological montage*” to Hollywood popular movies.

In *Kung Fu Panda 2*, the figure of the brutal antagonist peacock Lord Shen is stylistically portrayed based on the traditional Chinese folk art, paper-cut, which is a form of handmade craft cut from a piece of red-color paper by a pair of scissors to compose pictorial figures. As the representative “bad guy”, dictator of the Gongmen City, Lord Shen is, according to Forster’s definition, a two-dimensional flat character without any development throughout the story: brutal, tyrannous and cunning. Thus his figure is designed as a flattened paper-cut figure with a black-lined thin head and a red-colored crest, white-colored thin long neck and flauntingly spread feathers. This flattened portrayal of Shen lacks depth both characteristically and pictorially, especially compared with the much more rounded, lovely, heroic, protagonist Po in the following scene. Therefore, the portrayal of Shen with intentionally flattened volume and minimal roundness not only brings up the pronounced contrast with the protagonist Po’s volumetric roundness, but more interestingly, Shen represents a kind of “ontologically incompatible element” (Manovich) synthetically integrated into the 3D environment. The coexistence of the two visual regimes of 2D and 3D visibility renders the stark contrast between the two antithetical characters pictorially and also displays the topological relationship between them and their environments.

In the opening sequence, the flattened, thin, and paper-cut-like Shen is singled out from other characters, which display degrees of volumetric roundness, as well as the depth of the settings. This topological disconnectedness and discreteness makes Shen distant, not only from other characters but also, in psychological terms, from the audience. Shen’s flat and flimsy figure, even in the close-ups, is separated prominently from the 3D settings; his separateness from both the surroundings and other characters underlines his estrangement from the world in which he lives, where he is first denounced by his parents and then, by setting a fire and murdering them, usurps the throne of Gongmen City, grasping power through tyranny, brutality and cunning. The flatness of Shen’s skinny and thin figure, to a certain extent, emphasises his slyness and cruelty, further making the audience feel distanced and remote from him, especially in comparison with Panda Po’s rounded and adorable portrayal. Therefore, the topological *synthesis* of flatness and depth for characterisation and the resulting contrastive disconnectedness and connectedness with the audience between the two key adversaries serve the narrative effectively.

The synthetic manifestations of virtual depth and artificial flatness include two types: in one case, a flattened character is placed into the volumetric 3D settings (as described above); in the other, 3D characters act within flattened 2D settings. An example of the second kind can be also found in *Kung Fu Panda 2*, namely the Valley of Peace, where Panda Po lives before he goes to challenge Shen. The setting borrows from traditional Chinese landscape painting techniques, which intentionally decrease spatial depth while underscoring the atmospheric aura of the entire surroundings. The common devices to achieve this goal come with overlooking the perspectival principle, obscuring the background by painting mist, smoke or rain in the frame, and ‘squeezing’ the flattened objects and the vague background together by organic and delicate composition.

In light of these principles, the Valley of Peace as the ultimate home for Panda Po is virtually constructed as a mystic and peaceful mountainous village, simulating the famous Taoist mountain (Mount Qingcheng near Chengdu, Sichuan) which is the real home of the scarce wild pandas. The conspicuously flattened Valley of Peace, with its obscure and foggy background, accentuates the roundness of Panda Po and his fellow Kung Fu masters, the Furious Five. Whether in kinetic action scenes or confined conversational scenes, the beautiful but flattened environment plays an ornamental role, as the dynamic depth range is telescoped around the volumetrically rounded main characters in the fore planes of the positive parallax, maintaining these characters as the centre of the viewer’s attention. Furthermore, this flattened setting, as the home of our heroic protagonist, is consistently contrasted to the stark and hierarchical contours, shapes and layers, and the threatening depths, of tyrannous Lord Shen’s Gongmen City.

Another typical example of flat characters synthesised into 3D settings with spatial depth is a 2009 Argentine flash 3D animation *Boogie*. In this stylised 3D film, all the characters, which remain completely flat without any volume, are composited into different depth planes of the consistent 3D environment. They interact with each other in a lawless and amoral dystopian society, by killing and deceiving others to survive. Therefore, no one in the film, including the protagonist, Vietnam War veteran turned killer Boogie, is a hero, just as the promotion slogan of the film claims, “Boogie is the ultimate anti-hero: No heroes. Just one bad Mother F!@#%R!”. Hence,

the filmmaker actually pushes the boundaries of the depth philosophy adopted in *Kung Fu Panda 2* (in particular, the depiction of an antagonist with little depth) to the extreme, by flattening *all* the characters while consistently deploying them within constructed 3D settings; all characters in *Boogie* are bad guys to a certain extent. This strategy accentuates the alienation of the society and the separation of characters from their surroundings. All the flat characters interact and struggle with each other across the volumetrically abundant Z-axis space, as well as the widened X and Y-axis dimension, seeming to be squeezed and menaced by their hazardous environs.

In one scene, the aspect ratio changes to widescreen. In a parody of typical cowboy standoffs in Westerns, Boogie and an adversary cop stand face to face in the same depth plane in the establishing long shot. However, their flat figures appear to be separated topologically by the large distance between them. The vertically squeezed frame ratio makes both characters appear more hemmed in by their surroundings; meanwhile, their face-to-face position stresses their confrontational status. The topological discreteness of the two flat characters thus reinforces their mutual isolation as they are put into increasingly separated depth planes and continue their face-off. The 3D settings, tight frame and flat characters thus work together to amplify the coldness of character relationships and the huge pressure of the dangerous surroundings.

The *synthesis* in *Boogie* is adopted to distinguish all the “bad characters” from the stereoscopic rendering of their hazardous environment, so that the film’s central theme is accentuated: it is the lawless and amoral society that makes Boogie a bad guy. In *Sin City: A Dame to Kill For*, the synthesis of 2D flatness and 3D depth is used differently for action and fighting scenes in the lawless and sinful Basin City. The first *synthesis* in *Sin City II* takes no more than two seconds to show, or allude to, Marv pulling Manute’s eyeballs out of his head in a silhouette shot. Both fighting characters and the splattering blood and flesh are flattened, in comic book style, rendered in white against the volumetric black background. This shot thus suggests the bloody violence and graphical viscerality, while at the same time abstracting it. The second *synthesis* consists of two brief shots and shows a guard’s dismembered body parts scattering after being killed by the deadly assassin Miho, which is the same as the stylistic implication of ferocious violence used in the above example. The Z-

axis depth of the fighting environ in the third *synthesis* is much more accentuated, because a window frame is placed in the fore plane while the shrunken figures, Marv and a bunch of guards, fight in the deeper plane as flattened silhouettes. In summary, all these *syntheses* of flatness and depth are very brief and rapid, and their main purpose is to distance the audience from the graphical violence and make it appear as a mere representation. Such scenes work, once again, as “*ontological montage*”, producing contrasts and even contradictions between characters and the spaces they occupy.

The *synthesis* of 2D flatness and 3D depth can thus work not only to portray characters as antithetical (such as the protagonist and the antagonist, the good and the bad, the powerful and the weak, and so on). The symbiosis of depth and flatness can also convey meaningful thematic messages by either compositing 3D characters inside a flattened 2D setting or designing 2D characters within a 3D environment. Here, audience sympathies can be shaped and directed in complex ways, and our sense of the “reality” and concreteness of narrative worlds can also be altered dynamically (so that violence, for example, can be turned quickly into abstraction), while characters can become either alienated from or enveloped by their respective environments.

### **Conclusion**

The typical cases of flatness and its coexistence with depth in digital 3D cinema discussed in this chapter emphasise the narrative effectiveness of 3D’s ontological symbiosis of flatness and depth, which is revealed and crystallised via the four modes: *remediation*, *juxtaposition*, *morph* and *synthesis*. Such techniques can produce distinctive narrative effects relating to characterisation, transitions between different temporal registers and ontic regimes, thematic expressions, and representations of action and violence. The contradiction and coordination of virtual depth and artificial flatness may thus contribute significantly to stereoscopic storytelling. Therefore, when we think about stereoscopic 3D strategies, we need to bear in mind that these are not defined solely by the exploitation of depth along the Z-axis but also by a countervailing emphasis on flatness.

In summary, the four representative functions of 3D’s ontological binary of virtual depth and artificial flatness are: to distinguish action and emotional sequences;

to differentiate the temporal past and present; to distinguish between “real” and “virtual” diegetic worlds and narrative environments; and to portray antithetical characters (powerful/weak, protagonist/antagonist, etc.). These four aspects are most evident in 3D digital animation films; however, more and more 3D live-action films made in recent years have demonstrated such ontological accommodation of depth and flatness. Topological analysis shows how filmmakers have modulated flatness and depth in order to alter the presentation of characters’ actions and affects, as well as the spatiotemporal relations and ontological principles operating within different narrative “worlds”.

## Conclusion

This project has emphasised digital 3D cinema's contemporary status as a well-established vehicle for storytelling, rather than simply a gimmick, trick or spectacle. In particular, I have demonstrated how contemporary 3D films have become more sophisticated in their application of stereoscopic techniques for complex and elaborate narrative purposes. Rather than supplanting all kinds of narrative, my project shows, 3D can be used effectively and precisely to enhance and deepen aspects of story, drama and character. I began by discussing the "hyperrealism" of 3D cinema, which, with its (real or virtual) two-camera mechanism, refers to human beings' binocular vision. The resulting "reality effect" is ideal for the kinds of immersive stories that Hollywood favours. In recent films, however, this reality effect is governed and directed by a newly dominant paradigm – the Aesthetics of Recession. The Aesthetics of Recession, as I have emphasised throughout the project, depend primarily on the "positive parallax", with limited use of protrusion effects in the "negative parallax". Since 2009, this new paradigm has become entrenched as more and more contemporary 3D filmmakers have used it in their manipulation of spatiotemporal relations for storytelling purposes.

Towards the completion of this writing, I have seen more 3D movies released prior to the Christmas season, such as *The Walk* (Robert Zemeckis), *The Martian* (Ridley Scott), *In the Heart of the Sea* (Ron Howard), *Hotel Transylvania* (Genndy Tartakovsky), *The Good Dinosaur* (Peter Sohn), and *The Hunger Games: Mockingjay – Part 2* (Francis Lawrence), to name a few. These works have continued to operate largely according to the Aesthetics of Recession discussed in this thesis. They have also, on the whole, been financially successful, demonstrating the ongoing resilience of the latest wave of 3D filmmaking. More recently, J.J. Abrams's new episode of *Star Wars: The Force Awakens* has had a record-crushing global release since December 17<sup>th</sup> 2015 (Ford and McClintock, "Box Office: 'Star Wars'")<sup>31</sup>. The ongoing popularity of 3D films has effectively disproven Philip Sandifer's prediction that this most recent 3D boom would disappear within five years, following *Avatar*'s

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<sup>31</sup> Not coincidentally, in the world's second biggest movie market, Mainland China, a domestic 3D blockbuster film *Mojin: The Lost Legend* (directed by Wuershan) opened the Christmas-New Year season with a record-breaking debut at the same time as the worldwide release of *Star Wars: The Force Awakens*, which has been scheduled to release in China nationwide later on January 9, 2016 (Brzeski, "China Box Office").

unprecedented global success (62). Six years since *Avatar*'s release, the ongoing 3D boom seems headed in the opposite direction and has reached another peak with the worldwide release of *Star Wars VII*. As a matter of fact, digital 3D cinema's flourishing makes Sergei Eisenstein's much earlier prediction about stereoscopic cinema in 1947 more plausible: "To doubt that tomorrow belongs to stereocinema is just as naïve as it is to doubt the very coming of tomorrow" (20). Certainly, it is still too early to declare the maturity of digital 3D cinema at this stage. Indeed, 3D's evolving status is one reason for us to investigate its narrative potentiality, as more and more innovative filmmakers take up 3D filmmaking, and as more and more cinema scholars turn their attention to the aesthetics and theoretical implications of 3D.

Certainly, aspects of popular discourse suggest a shifting conception of the relationship between narrative and stereoscopy. Michael Cieply, for example, describes the 2015 Christmas movie season in a *New York Times* article as follows: "Hollywood's major studios are preparing to flood festival screens and commercial theaters with an unusual, year-end wave of grown-up movie spectacles — shown in the 3-D or large-screen format that is usually reserved for action blockbusters with younger audiences" ("Hollywood Uses Bigger Screens"). As *The Walk*'s director Robert Zemeckis argues, 3D and other technological advances have made it possible "to tell strikingly visual stories cheaply enough to let studios bet on sophisticated viewers, rather than relying on a teenager-driven mass market or a predefined fan base" (Zemeckis qtd in Cieply). The strategy of using 3D in this way to attract "sophisticated viewers" suggests, at the very least, that Hollywood is vesting more interest in applying the technology to a wider range of genres. Baltasar Kormakur, director of *Everest* (2015), explains that, in his use of 3D for the film, "I wanted to match the intimacy of independent movies and the spectacle of an epic blockbuster" (Kormakur qtd in Cieply). Ron Howard states regarding his 3D production of *In the Heart of the Sea* (2015): "The more palpable and immersive the experience, the more personal the film feels" (Howard qtd in Cieply). Although such arguments run the risk of underplaying the sophisticated narrative techniques and spatiotemporal figures already evident in blockbuster 3D films, they do suggest a shift in attitudes (on the part of both filmmakers and popular critics). Moreover, they serve as well to support

the case I have been making: 3D has become an ideal choice for filmmakers who have the ambition of integrating sophisticated storytelling with spectacular effects.

In sum, the embodied techniques and tropes of contemporary 3D storytelling, supported and enabled by the Aesthetics of Recession, include: constructing multiple “timespaces”, in which dramatic movements and actions interplay; orchestrating and staging in depth across the 3D field screen, to establish dramatic encounters between characters; layering and juxtaposing narrative perspectives and exploring their relationship with spectatorial perspective; counterposing depth and flatness to make dramatic and ontological distinctions between different characters and spaces.

The rapid evolution of contemporary stereoscopic cinema makes it quite possible that further innovative narrative uses for 3D will emerge as time passes. In this context, what is the “imaginable” form or genre for the mature 3D cinema? André Bazin’s concept of “filmed theater” in the 1940s may be instrumental in answering this question (1: 76-124), as suggested by the following statement from director Ang Lee: “Future 3D technology will change cinema from inside out: for example, in the future 3D cinema won’t need much editing, making it more like the stage, because it feels more real; accordingly, lighting and production designs will all change as well” (Xiao, “Ang Lee”). As I stressed previously, the stereoscopic “hyperrealism” generated by contemporary 3D cinema is completely distinctive and much evolved from the Bazinian “realism” shown in the “filmed theater” works in the 1940s. Nonetheless, by integrating with emergent technologies such as 4K, High Frame Rate, and Virtual Reality, digital 3D cinema will continue to exert an enticing “reality effect” based on its deep space and volumetric abundance. The precise form it will take remains unclear. However, it seems extremely likely that 3D will continue to provide filmmakers with opportunities for producing work that is both highly immersive and rich in narrational possibilities.

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