https://orcid.org/0000-0003-2746-9098

VIRTUALLY REAL

CINEMATOGRAPHIC VERISIMILITUDE WITHIN THE CONSTRUCT OF ARTISTIC REFERENTIALITY

SUBMITTED BY

DR DANIEL MADDOCK

https://www.linkedin.com/in/maddockdaniel/

https://www.instagram.com/dr_danielmaddock/

https://twitter.com/DanielMaddock2

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ABSTRACT

The creation of so-called realistic images is seemingly incongruously a key aspiration for many feature film cinematographers creating dramatic films today. This may be, as theorised by Charles Pierce, that the lens-based imagery of photography, and by extension cinema, is connected to reality in a way unlike any other artform. Prince refers to the cinematographic form as a tension between perceptual realism and referential artifice. He uses the term perceptual realism in reference to Peirce's claim of the photograph as icon. With the term referential artifice though, Prince is suggesting the artificial proposition of film making is in reference to the subjects and object within the frame. This concept can be extended when connected to Bordwell, Thompson and Smith's claim that stylistic choices are made in reference to the film's content, its script. For example, a period film may be captured on celluloid film negative whilst a science fiction narrative may be captured with the newest digital cinema camera. Realism, however, does not necessitate the same or even a similar cinematographic form response for feature filmmaking. This essay will explore how feature film cinematographers interpret realism or verisimilitude within the construct of artistic referentiality as a response to narrative content.

Key Words: Cinematography, Authenticity, Realism, Verisimilitude, Impressionism, Referentiality, Documentary, Direct Cinema, Cinéma Vérité, Cinematographic,

SECTION ONE: INTRODUCTION

The American philosopher, logician, mathematician, scientist and founder of modern semiotics, Charles Sanders Peirce, wrote a paper titled, *What is a Sign*[1], proposing his concept of the triadic model of indexical, iconic and symbolic signs in 1894. This paper was published less than ten years after the commercialisation, and therefore popularisation, of modern celluloid photography, which occurred in 1885 when the first flexible photographic roll-film was marketed by George Eastman, founder of Kodak. Before this, other more expensive and difficult to undertake processes of photography were used creating images on metal or glass plates as early as the mid-eighteen-thirties. Suffice to say, photography had not long made its mark on society when Peirce determined its value as an icon.

> Photographs, especially instantaneous photographs, are very instructive, because we know that in certain respects they are exactly like the objects they represent . . . they . . . correspond point by point to nature. In that respect then, they belong to the second class of signs, those by physical connection.[2]

Peirce's understanding of a still photograph as an icon having a strong connection to its referent has led to an emphasis on realism within the medium. This basis in photographic realism easily translated to the moving photographic image which was born out of an extension of the process of still photography; consider Muybridge's experiment linking multiple still photography cameras in order to create motion. This classification and purpose for the mediums of lens-based imagery as a medium which reproduces reality through the optical photochemical process is clearly represented in the conflicting views of Australian war correspondents Charles Bean and Frank Hurley during the Great War. Frank Hurley, a photographer and filmmaker known for his coverage of Sir Douglas Mawson's Antarctic voyage, was one of Australia's official war photographers during both world wars. During World War One Hurley tried repeatedly to make single images that encapsulated all the drama of warfare, but he felt the task was impossible. Instead, he turned to the darkroom, to create composite images, using parts of different negatives, as he had done for his Antarctic work. Hurley's frustration is captured in a voice-over from the documentary film *Frank Hurley: The Man Who Made History.*[3]

> To include the event on a single negative, I have tried and tried, but the results are hopeless. Everything is on such a vast scale – figures are scattered, the atmosphere is dense with haze and smoke, shells will not burst where required. Might as well be a rehearsal in a paddock![4]

Figure 1. One of Hurley's most famous composited photographs made from several different originals taken during World War One.[5]

Hurley viewed the manipulation and combining of photographic images as a means of capturing the enormous scale of war, which would otherwise be technically impossible to convey in a single image. There is no question of Hurley orchestrating or manipulating actual events, but his composites can rather be viewed as compressed and dramatically enhanced versions of reality.[6] Charles Bean, his commanding officer, did not agree. He regarded them as fakes and forbade Hurley from exhibiting them. Hurley resigned from his post, although later retracted his resignation and sought a post in the Middle East, far away from the auspices of Bean.

This conflict presents a dichotomy of belief in the understanding of the mediums of lens-based image production (still or moving). Yet, both points-of-view, Hurley's and Bean's, desire the same outcome; a representation of reality. Moreover, the creation of so called believable and realistic images is seemingly incongruously a key aspiration for many feature film cinematographers creating dramatic films today. This may be, as theorised by Pierce, that the lens-based imagery of photography and cinema, is connected to reality in a way unlike any other artform.[7] Stephen Prince, in a landmark essay for the journal *Film Quarterly* refers to the cinematographic form as a tension between perceptual realism and referential artifice.[8] He uses the term perceptual realism in reference to Peirce's claim of the photograph as icon. With the term referential artifice though, Prince is suggesting the artificial proposition of film making, a construction of time and

space meant to pass as unnoticed construction, is in reference to the subjects and object within the frame. He notes Barthes' claim that photographs are connected to their referents but extends it by suggesting the truth of this statement even wherein the referents are not real themselves. This tension is obvious where fantasy filmmakers produce artificial creations, digital or physical, which are designed to appear as credible photographic realities. These concepts can be extended further when connected to Bordwell, Thompson and Smith's[9] claim that stylistic choices, or what can be referred to as the design of cinematographic form, are made in reference to the film's content, its script.[10] This type of referentiality can be defined as artistic referentiality as the artistic element (cinematography, lighting, set design etc.) is in reference to the narrative. For example, a period film may be captured on celluloid film negative, due to the medium's long history capturing cinema, whilst a science fiction narrative may be captured with the newest digital cinema camera to communicate the technological leading-edge of the future. Realism, however, does not necessitate the same or even a similar cinematographic form response for feature filmmaking. Like Hurley and Bean, cinematographers have different points of view on the matter and as Prince notes, different narratives necessitate different referential responses. This essay will explore how modern feature film cinematographers interpret realism or verisimilitude within the construct of artistic referentiality as a response to the narrative content.

SECTION TWO: A HISTORY OF CINEMATOGRAPHIC REALISM

The Lumière brothers were among the first to introduce the experience of cinema to the world with their cycle of production and presentation at the close of the nineteenth century. Their short documentary film *La Sortie de L'usine Lumière* [Workers Leaving the Lumière Factory][11] consisted of a simple forty-six-second shot of the mostly female workers of the Lumière factory in Lyon, France, walking out of the doors. The camera never moves and nothing else happens.

Figure 2. Still from the short documentary film *Workers Leaving the Lumière Factory.*[12]

While three versions of this film exist, the composition and action are the same in all of them except for the addition of a horse and cart, and the change of clothing style due to a change in the seasons. It is thought the Lumières' shot the versions within the same year, potentially a testing period.[13] The Lumières' film is a document of its time, unmanipulated, like a window to the past. The film seemingly contains no construction of filmmaking, no design. It functions as a simple tool, capturing movement and tonality. This film, and its method, are in stark contrast to the work of American filmmaker Norman Dawn who developed a way to recreate history in order to bring the audience closer to the story. Like Hurley did for still photography, Dawn was one of the earliest cinematographers to use special photographic techniques, producing seamless

composite imagery for cinema as early as 1907. His work represents one of the first examples of virtual cinematography, and it would have a lasting impact on film production.[14]

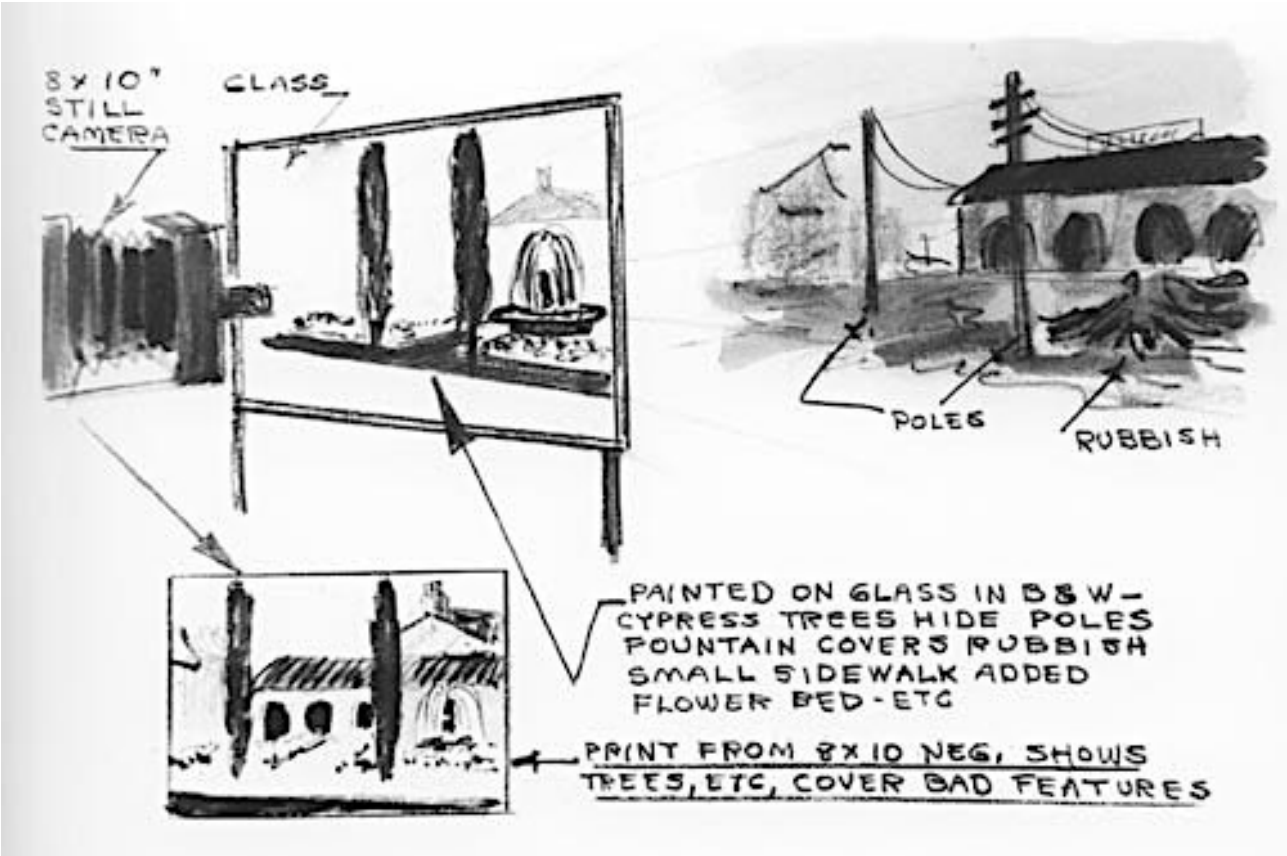

Figure 3. Dawn's own illustration indicates the process for achieving the glass-plate shot that he learned while working as a photographer for the Thorpe Engraving Company. He made this drawing in 1905 and later adapted this process for first use in cinema.[15]

Dawn accomplished an early virtual image by placing a piece of glass between the scene to be photographed and the camera. The cinematographer then painted on the glass to either add to the scene or cover something undesirable. Figure 3 is an illustration from Dawn's notebook, drawn while he worked at the Thorpe Engraving Company as a photographer in 1905, of how to achieve this type of image. He was subsequently the first to apply this to motion photography, when working on a travelogue titled *Missions of California*[16] (also referred to as *California Missions*) about Catholic missions established by Spain along the coast of California in the eighteenth century. Dawn noticed these historic sites were crumbling with age and was inspired to use the technique to virtually restore the dilapidated buildings to their former glory. He went on to become a prolific filmmaker, cinematographer, and visual effects pioneer (or what was referred to as special photographic effects during his career). However, in Craig Barron and Mark Cotta Vaz's book *The Invisible Art: Legends of Movie Matte Painting*,[17] Dawn is quoted in relation to why the world of virtual imagery and image manipulation in cinema was not considered significant until the digital revolution:

> The breakthrough of original-negative matte painting was never publicised. "Even when I was at Universal, they [studio heads] didn't believe in telling anybody about effects," Dawn said. "…They considered anything that was a drawing or a glass shot a fake. So they didn't want to let the exhibitors know that this was a cheap picture full of fakes." "In the old days special effects was a secret thing," explained Ellis 'Bud' Thackery, a contemporary of Dawn. "We were not allowed to have screen credit in those days… it was all a big, dark secret."[18]

Figure 4. MGM Studios' secret matte painting department. Note the blacked-out windows.[19]

As pointed out by Dawn and his contemporaries, the discussion of how best to achieve perceptual realism was present in the medium from the very beginning. Hurley and Dawn were two early filmmakers who endeavoured to present the reality they perceived but could not technically capture, but could, however, create. Hurley, as stated earlier, experienced technical limitations with the photographic equipment at the time, but nevertheless, sought to represent the truth of war as he saw it. He therefore considered his depictions to be more realistic than any unmanipulated photographs of the time. Dawn sought to present an authentic view of the past, historically accurate and representative of the truth as it was before time destroyed it. Dawn did this many times and even used the same approach for his narrative work restoring the famous Port Arthur Jail to its former glory when making one of Australia's early feature films *For The Term of His Natural Life*[20] which was shot in Tasmania.

When filmmakers and film-viewers discuss realism in cinema they are actually referring to verisimilitude, as of course viewers of narrative cinema do not believe the films they view are actual real events that were captured on camera by the filmmakers. Further, verisimilitude for the cinema image can be understood by what contemporary British philosopher Stephen Neale refers to as 'cultural verisimilitude' which he defines as the plausibility of a fictional work within the cultural or historical context of the real world.[21] So, although the Port Arthur Jail had crumbled to ruin, and the Spanish Catholic Missions built along the coast of California had dilapidated badly, they were once new buildings. Therefore, within the historical context, the audience can believe the visual plausibility of the fictional work as a historical reality, a cultural, or cinematic, verisimilitude. For non-historical contexts though, the complex nature of cinematic realism comes

to the fore. Many modern films use computer-generated-imagery (CGI) in the same way Dawn used the glass-plate shot, and, for the same outcome, to achieve a level of realism that would be otherwise impossible for their given narrative.

SECTION THREE: A MODERN TAKE ON CINEMATOGRAPHIC REALISM

Early cinematic approaches to realism by Hurley and Dawn are not unlike the approach made by modern filmmakers, director Alfonso Cuarón and cinematographer Emmanuel Lubezki, for the heavily computer-generated film *Gravity*.[22] The film, set entirely in space, is about two astronauts, one of whom dies in a disaster, whilst the other survives through extraordinary feats. For *Gravity*,[23] Lubezki was involved early in pre-visualisation to create lighting and camera-movement modelling for the movie. This resulted in Lubezki lighting the entire film in pre-production through the use of pre-visualisation software and Computer-Generated Imagery (CGI) before a physical camera or actor was seen, creating a process that completely reversed the traditional one. Lubezki directed teams of Visual Effects (VFX) artists by thinking of them as his virtual gaffers (lighting technicians) and virtual camera operators. He therefore perhaps saw his work on this film as simply a continuum of his usual practice through virtual means.

> Lubezki was deeply involved in every stage of crafting the real and computer-generated images. In addition to conceiving virtual camera moves with Cuarón, he created virtual lighting with digital technicians, lit and shot live action that matched the CG footage and fine-tuned the final rendered image…[24]

Some struggled to understand Lubezki's work, particularly since it is estimated that more than ninety percent of the film is composed of virtually created images. Associate Professor Julie Turnock, notes that most of the film, excluding the actors' faces, was digitally generated, and therefore questions whether it should be considered a live action film or an animated film.[25] She further explains the controversy in her chapter in the book *Transnational Cinematography Studies*.

> …the production gave rise to other controversies: if the majority of the film was designed and rendered in the computer, where do we divide the responsibilities or assign credit for its excellence? For cinematographers in particular, *Gravity*, in the wake of similar acclaimed, Academy Award-winning films such as *Avatar* (Cameron 2009, Fiore credited DP^2), *Hugo* (Scorsese 2011, DP Richardson), and *Life of Pi* (Lee 2012, DP Miranda) emerged as a flashpoint for a debate on what is the job of a cinematographer on nearly fully animated Hollywood blockbusters. As Roberto Schaefer asserted: "To me *Gravity* was an animated movie. Beautiful! Beautiful visual effects. Absolutely stunning. It should have gotten every award for visual effects ever designed, ever given. But it should not have gotten the Best Cinematography award.[26]

However, Lubezki's approach and signature style can clearly be seen in the images of this film. Two separate interviews with Lubezki in *American Cinematographer* explain his process and how he has transferred his usual approach to this new type of filmmaking. Lubezki discusses his approach to lighting for the films *Tree of Life* [27] and *To the Wonder*. [28]

On *Tree of Life* we really tried to do combinations of scenes with light and scenes without, and when you add movie lights they don't have the complexity of natural light. You're putting one light that has one tone and one color through some diffusion, and it doesn't have the complexity of natural light coming in through the window from a blue sky and clouds bouncing green off the grass. Some would call that kind of light imperfect, but it's more accurate to call it more complex. That complexity of natural light and the way it hits the face is amazing, and when you start to go that way it's hard to go back and light [things artificially]. The less you use artificial light, the more you want to avoid it, because the scenes feel weak or weird or fake.[29]

Figure 3. Still frame from the film *Tree of Life*[30] from *American Cinematographer*.[31]

Figure 4. Still frame from the film *Gravity*[32] from *American Cinematographer*.[33]

A clear comparison can be made between Lubezki's work on *Gravity*[34] and *Tree of Life*,[35] even though one film was shot with mostly natural light from the sun and the other was shot in a studio with computer-programmed and rehearsed LED lighting.

> Inside the LED Box, the CG environment played across the walls and ceiling, simulating the bounce light from Earth on the faces of Clooney or Bullock, and providing the actors with visual references as they pretended to float through space. This elegant solution enabled the real faces to be lit by the very environments into which they would be inserted, ensuring a match between the real and virtual elements in the frame. For Lubezki, the complexity of the lighting from the Earth source was also essential, giving nuanced realism to the light on the faces. "When you put a gel on a 20K or an HMI, you're working with one tone, one color. Because the LEDs were showing our animation, we were projecting light onto the actors' faces that could have darkness on one side, light on another, a hot spot in the middle and different colors. It was always complex, and that was the reason to have the Box."[36]

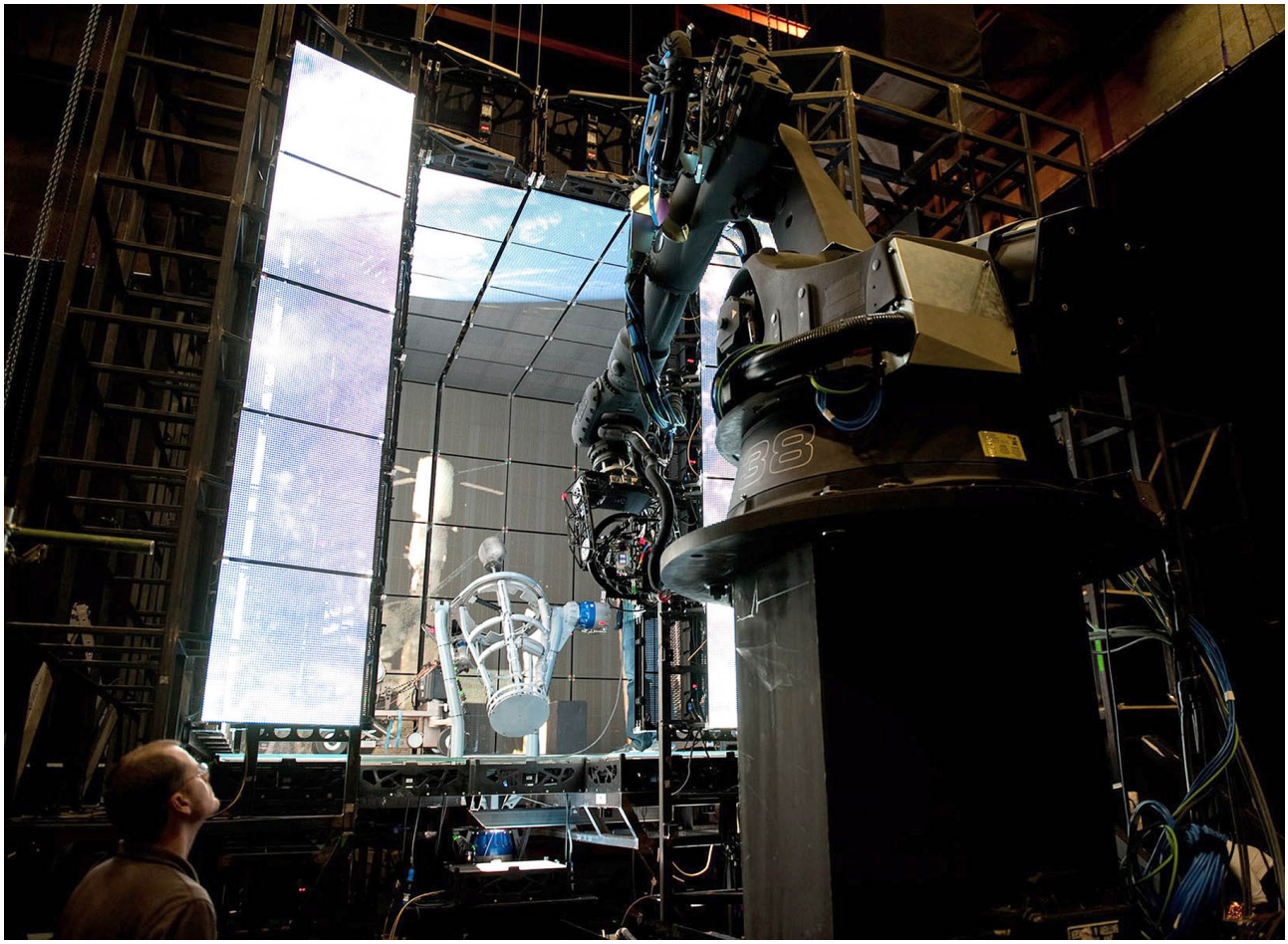

Figure 5. Behind-the-scenes photograph[37] from the production of *Gravity*.[38] This photograph shows the LED light box that projected images (in this case, the Earth can be seen on the box's ceiling) on the actors rather than using a single, traditional lighting fixture. Photographer unknown.

Lubezki's methods can be seen as a pioneering step in cinematographic history and could become the standard practice of the future for cinematographers working in cinema and in other forms of visual-narrative storytelling. More importantly, the endeavours of those filmmakers for this production show the level of detail they are willing to create in order to achieve an astonishing degree of realism. Lubezki links the actor, performing in a soundstage, to the virtual image, through the referent of lighting. He knows the nature of 'real light,' as opposed to manufactured cinematic lighting, is complex and therefore achieves this by lighting the actors with an image rather than a film lighting fixture. Lubezki has borrowed from cinematic mediums of realism, such as the documentary movement of Direct Cinema, to create cues to realism, or, realism tropes.

SECTION FOUR: THE DOCUMENTARY TROPE OF CINEMATOGRAPHIC REALISM

Direct Cinema, which grew out of a combination of budgetary restrictions, newly developed technologies, and, the schemas that came before it such as Cinéma Vérité created a series of cues to realism which are still used today in cinema.

> A new generation of artists and craftspeople trained not in Hollywood studios but in New York or overseas, often in television or in documentaries, entered feature filmmaking. Suspicious of glossy artifice passing as realism and influenced by the playful visual styles of the European New Wave, the immediacy of Direct Cinema documentaries, and the rough vigorous of New York independent filmmaking, a younger generation of cinematographers incorporated previously questionable visual choices into their professional practice, including zooms, unstable hand-held camerawork, unglamorous lighting, lens flare, and deliberate overexposure. If properly motivated, these "imperfections" now functioned realistically as signs of authenticity.[39]

This style of deliberate imperfection was pursued over the two decades following the end of World War Two in 1945 and encouraged by technical advances which allowed the filmmakers greater freedoms. Documentary filmmaking, likely because it was not imbedded in the history and hierarchy of studio feature filmmaking, was the first to be impacted by these innovations in style and technology. In 1959, filmmakers convinced two United States government senators running for election that they should allow them to film everything they did in the candid manner of news magazine still photography. The result was the milestone documentary film *Primary*.[40]

This documentary was new in a number of ways. Its filmmakers did not stage scenes as previous documentary filmmakers had, such as Robert Flaherty did for *Nanook of the North* [41]; they didn't produce dramatic reenactments of situations they deemed too difficult to capture such as Frank Hurley had done in both World Wars or as John Huston had for *The Battle for San Pietro*;[42] they did not do interviews as Arthur Elton and Edgar Anstey had done in *Housing Problems*;[43] nor did they hide their camera like John Huston in *Let There be Light*.[44] Their varied schema came from what a newly developed camera could now allow them to do as Mark Cousins describes in his book *The Story of Film*.[45]

> Take a famous scene from Primary, where one of the senators - John F. Kennedy, who would be President in a year - is in a car. Albert Maysles films him there with a new, light 16mm camera. Kennedy gets out, goes in to a meeting, shakes hands, goes up a stairway and on to a stage. The camera follows him the entire way and does not cut. What's unusual in that, one might ask? Mizoguchi and Ophüls had both used long tracking shots and the opening scene in Orson Welles' Touch of Evil (1958) did the same thing. However, in these cases the scenes were staged, rehearsed, and filmed on dollies and tracks, in sets or cleared

> spaces. Drew's long shot of Kennedy was filmed from the shoulder, in real-life, crowded spaces, following Kennedy wherever he went, regardless of focus or lighting.[46]

This new technology and new approach to camera operation resulted in what would be described by practitioners at the time as mistakes; shaky operation, soft focus at points and poor composition at others. These mistakes, however, became the hallmarks of authenticity. Because documentary films began to use this style of cinematography during this period of filmmaking, the Direct Cinema movement, and because documentary films are real, these mistakes therefore were real, and so there use in fictional filmmaking would come to visually mark authenticity. The producer and director for *Primary*,[47] Robert Drew, remarked about the impact of his film on cinema that within the year following its release, fiction films began coming out using similar techniques.

> We're trying our damndest to make the shaky camera smoother and over there they're making them shaky to look like us! So Breathless [Jean-Luc Godard, 1961] appears, and Tom Jones [Tony Richardson, 1963], and a whole succession of films that are using our "look" to - I don't know, to gain authenticity, I guess.[48]

The impact of this transitional period in American filmmaking cannot be overstated, not least because of its political effect on the status quo of filmmaking. When director Terrence Malick hired European cinematographer Nestor Almendros, ASC to shoot his film *Days of Heaven*[49] eighteen years after the release of *Primary*[50] the effect of old Hollywood professional discourse still lingered. Almendros used natural sunlight pouring sideways through the windows of the old homestead to light the interior scenes of the picture. He overexposed those windows and doorways while underexposing the interior spaces of the house. This went against the professionalism of the day and Almendros had to convince his crew that it was okay to underexpose the lead actor's face. The apparent rules of cinematography however were too rigid for some causing those crew members to resign in protest during the making of the film.[51] This rigidity in filmmaking and cinematography would take many years and several new filmmakers, who became auteurs in cinema's history, to break.

Figure 6. Blown-out window light being used to naturally light the character inside this otherwise dark room, screen-grab from *Days of Heaven*.[52]

Consequently, today fictional cinema which utilises realistic imagery is cinema which draws on the history of documentary filmmaking techniques, even when that cinema contains heavily computer-generated imagery. Therefore, any virtual process of image making for cinema that results from a computer rather than a camera must conform to the established language in order to espouse verisimilitude.[53] As Peers suggests, the language of cinema was born out of the medium's development in the first decades of cinema. Of course, this medium is characterised by its use of the camera to create moving pictures.[54] Again, as Peers observes, visual perception, culture, and psychology are among the many things that influence the visual design the cinematographer brings to cinema's images. Although new possibilities following camera technology improvements or new improvements in the technology of computers and software have offered new developments in cinematic language, research has shown that these changes can cause discontent among the viewing public and film critics.[55]

SECTION FIVE: EXPERIMENTAL CINEMATOGRAPHIC REALISM

The visual language of cinematic reality has been extended in recent years with the attempt of some filmmakers to introduce a technique in film production that could increase the perceived sense of an image's authenticity. *Billy Lynn's Long Halftime Walk*[56] is the latest incarnation of this attempt at re-writing, or evolving, the language of cinema images—the language of cinematography. It was shot at what has become known as '4K', a very high-definition digital image that has more than four times as many pixels as the previous high-definition digital format of 1920 x 1080. This film was also captured in 3D, using two cameras to replicate the two eyes of the human vision system. Additionally, the film was captured at a much higher frame rate than standard cinema's twenty-four frames per second. Lee and his cinematographer John Toll, ASC (a two-time Oscar winner for Best Cinematography), shot the film at different frame rates depending on the scene, ranging from forty-eight frames per second to 120 frames per second. The effect of this new technology and practice was to create an image for the film that is ultra-sharp and has no motion blur; the characteristic effect of fast action in cinema is to blur the image, whereas every individual frame of *Billy Lynn's Long Halftime Walk*[57] could be a sharp, still photograph. Commentator Daniel Engber[58] discusses the reception of the film among cinema critics:

> Ang Lee, the three-time Oscar-winning film director, did his best to lower expectations. "It's kind of an experimental movie," he said at the Friday night premiere of *Billy Lynn's Long Halftime Walk* at the New York Film Festival. …Lee knew its novel look—unrelenting clarity, abundant blooms of fine detail—might come off as more disturbing than impressive. "This is not just a new technology, but a new habit in watching movies," he warned the crowd. "I hope you keep an open mind."[59]

Engber goes on to describe how a scene looked "un-cinematic", like a "theatre sketch acted out in virtual-reality."[60] Engber then explains that the press notes for the film pointed out that by shooting in the unprecedented high frame rate, 3D, high-resolution format, the production stored forty times more data than a standard film. That is five times as many frames per second, four times as many pixels in each frame, and then everything doubled for 3D. Engber asks "how could all this extra information fail to make the movie better?"[61] This question has been addressed in a study carried out by Wilcox et al. in their article titled "Evidence That Viewers Prefer Higher Frame-Rate Films."[62] In their study, viewers rated short movies on four technical attributes (realism, clarity, depth quality, and smoothness of motion) as well as on their overall likability. On every measure, the subjects reported the high-frame-rate clips were superior.[63] Yet, as Engber claims, many commentators disagree with Wilcox et al.'s viewers, suggesting that "if high-frame-rate looks so damn good, then why don't we like it in the theatre?"[64] Engber answers his question, surmising that film clips used in high-frame-rate lab research tend to be artless and straightforward documentary shots of trees or abstract animations.

> The frame rate could be a turnoff only when it's mixed with the grammar used for telling stories on the screen. Montages, tilts, and focus pulls provide a structure for a movie; they work like punctuation marks on a printed page, barely noticed guides for your attention. In Billy Lynn, the HFR makes those guides pop out. Panning shots no longer blur the background with their motion; cuts seem extra jagged. As a viewer, it felt like reading a book in which all the commas and periods had been put in bold and underlined.[65]

These audience responses to high-frame-rate productions could be likened to readers' responses to stream-of-consciousness writing such as that practiced by the Bloomsbury Group of writers, which included Virginia Woolf. This type of writing involved depicting the multitudinous thoughts and feelings that pass through the mind and therefore was responsible for long, seemingly incomprehensible, sentences or passages with little or no punctuation. However, this experiment in form never became popular and although it may be an interesting device in literary circles, it is likely unknown to the mainstream consumer of novels. It is possible that the ability of digital cameras and projectors to display high-frame-rate video may later be viewed as an historical experiment rather than the new normal of film grammar. Interestingly, higher frame rates than those used for traditional cinema have been used successfully in video games for years and therefore make up the grammar and language of that medium. As Turnock points out in her essay, not all forms of moving pictures have the same prestige; some are deemed more sophisticated than the others. Therefore, a movie shot with a high-frame rate suffers from its likeness to less-vaunted forms of entertainment such as soap operas, sporting events, and video games.[66]

Experimentation in cinematic grammar has not always been embraced by the audience. It may be that, in a few years, filmmakers will study *Billy Lynn's Long Halftime Walk*[67] to understand how cinematic visual grammar adapted when the image was delivered with unprecedented clarity and subtlety.[68] Experiments such as these from director Ang Lee and also from director Peter Jackson who trialled a single speed of high-frame rate capture for *The Hobbit*[69] continue to be just that—experimental. Whether this experiment might eventually lead to an acceptance by the audience of a new aesthetic in cinema or continues to be rejected as a grammatical error in filmmaking remains to be seen.

Currently, the grammar of cinema holds several tenets. First, cinema conforms to *camera reality*; in other words, the photograph or moving image refers to the subjects and objects within the frame. This cinema image seeks to refer to its real-world referent within the grammar of the film as dictated by the narrative's design and needs. Secondly, the narrative (content) informs the production of the film (form) just as Jean Baudrillard[70] reflected on the work of cinematographer John Alcott, BSC and director Stanley Kubrick to illuminate the film *Barry Lyndon*[71] only with lighting sources available during the period in which the narrative is set, to enhance the sense of reality for the audience. Finally, to further strengthen the visual link of camera reality, it is important that the images include what would normally be considered to be 'defects' associated with the cinema lens's optics or film-stock limitations, such as lens flare or grain. This

construction of cinematic defect can clearly be seen in the artefacts applied to the images of *Gravity*.[72] In particular artefacts such as the lens flares, once considered a mistake in traditional Hollywood filmmaking, have been created in order to suggest the presence of a physical lens and its reaction to the sunlight streaming into it. When keeping these tenets in mind the difference between cinema captured by the physical camera and cinema created with a virtual camera is only one of modality and method.

SECTION SIX: REAL VIRTUAL IMAGES

Jurassic Park[73] marked the first replication of living beings for a narrative film that needed to maintain a high level of reality. At the time, this offered an extraordinary challenge to VFX Artist Denis Muren, ASC.

> "Although the dinosaurs in Jurassic Park were extinct, they had lived. They were real creatures—living creatures. We had to light them as we would living, breathing beings," Muren explains. "That's something we had never thought of before! Now we had to create the tools—computer coukaloris [a flat black card or screen with a specialised random cut-out pattern of holes used for making shadows in combination with a lighting fixture], flags and other equipment to make shadows. We had to figure out things like duplicating the inverse square law fall off. As light goes away from a source, it 'falls off,'" he explains. "It is no accident that a cameraman broke the program! A computer programmer doesn't know that the tools have to fit the rest of the movie. And, if that programmer has been told, he most assuredly doesn't understand all the subtle filmic concepts."[74]

As Muren states, it was particularly important to treat the virtual dinosaurs as if they were real, and therefore as if they were shot by a film crew on location. The serious nature with which the filmmakers treated the 'dinosaurs', these virtual images, is a step towards a level of representation that is closer to science than cinematic fantasy.[75] As Hammond, the character within the narrative who is the creator of the theme park, remarks in the film, "I want to show them something that isn't an illusion" (Spielberg 1993).[76] To that end, the film's cinematographer Dean Cundey, ASC, explains his ideology for the film.

> "The audience has to believe the unbelievable," says Cundey. "You have to give them as much reality and recognisable truth as you can. They have to walk in the shoes of the characters. They have to feel the terror when the experiment goes wrong and a handful of people isolated on an island become prey for dinosaurs."[77]

Cundey is referring to the continuing struggle between the idea of reality and the trick of illusion in cinema, the believability or verisimilitude. So, although Spielberg's narrative is fictional, the audience are willing to believe it could have happened - given the way in which that world is presented, (Hall 1997).[78] This film's images have a high-degree of realism, or verisimilitude, as of course, no one thought the film was an actual real event that was captured on camera by the filmmakers. Rather, the audience understand its form as a dramatic presentation but believe its presentation to be an accurate 'simulation'. For instance, Stephen Prince notes that when the velociraptors hunt the children inside the park's kitchen during the climax of *Jurassic Park*[79](Spielberg 1993), the viewer sees the dinosaurs' movements reflected on the gleaming metal surfaces of tables and cookware. These reflections anchor the creatures inside Cartesian space and perceptual reality and provide a bridge between the live action and the computer-generated environment (Prince 1996).[80]

Prince explains the importance of this existential connection through Charles Peirce's Triadic Model noting that Peirce identified the photograph as an icon that corresponds point by point to nature (Prince 1996).[81]

However, it would seem that with the introduction of CGI, the cinema image no longer belongs to the second class of signs he refers to, those by physical connection. This is because although the physical connection remains, even if somewhat partially, the alteration of the original copy weakens the physical connection, therefore disconnecting it from its referent. For instance, light simulated in the computer doesn't need a source or lighting fixture to create it. Shadows can be painted in irrespective of the position of the existing light captured by the camera on location. For computer images, lighting—which in photography is responsible for creating the exposure and the resulting image—is strictly a matter of painting, of changing the brightness and colouration of individual pixels (Prince 1996).[82]

Yet, Muren engaged computer programmers to create software that would mimic physical cameras, physical lenses and physical lighting. Muren purposefully built all the restrictions of the physical world of filmmaking into the software. In the case of *Jurassic Park*,[83] the dinosaurs are not necessarily convincing realities (as no-one actually knows what a dinosaur looked like) but instead convincing *photographic* realities conforming to a 'cultural verisimilitude'. Due to cinema's long history, a cinematic reality has been established in the common psyche—one that applies specifically to cinema and is therefore not the same as an individual's reality though it does refer to it.

SECTION SEVEN: CONCLUSION

This article has detailed the history of the desire for realistic images in the lens-based practices of photography, and then cinematography, starting with the invention of the still photograph and its definition as an icon in 1894 by semiotician Charles Sanders Peirce. Since Peirce related the photograph by physical connection to the reality it was capturing practitioners of lens-based arts have pursued realistic imagery. Though the term *realism* has been used frequently throughout the history of lens-based practices it is actually incorrect to describe images in this way as a recorded image cannot be *real* in the same way the event the camera used to make the image was real. The term real can more clearly be replaced with verisimilar. Further, using Neale's definition, the images of lens-based practices are culturally verisimilar, that is to say that culturally verisimilar images are plausible within the cultural or historical context of the real world, even if those images are of fictional narrative.[84]

The introduction of virtual means of altering images caused much controversy in recent years, especially wherein the definition of the practice of cinematography is concerned. In some cases, cinematographers suggest this type of work does not equate to cinematography. Christopher Doyle, HKSC, commented on the Academy of Motion Picture Arts and Science's choice of *Life of Pi*[85] for the 2013 Oscar for Best Cinematography in a Feature Film:

> Of course they have no fucking idea what cinematography is. The lunatics have taken over the asylum… The award is given to the technicians, to the producers, it's not to the cinematographer… if it were me, I would've said fuck off if somebody manipulated my image that much, I wouldn't even turn up. Because sorry, cinematography? Really? Perhaps an Oscar for virtual cinematography should be inaugurated.[86]

Despite this displayed furore over the so called 'manipulation' of images it is clear that the images of photography and cinema have always been manipulated. Research has shown that manipulation was an element of the practice from the very begging as photographers and cinematographers experimented with their craft both through the camera and in the dark room.[87] However, research also shows new experiments in the medium, utilising the affordances of new technologies in cinema specifically, don't always succeed. Audiences are not generally accepting of changes to what some writers, such as Engber, have referred to as the grammar of filmmaking. This is perhaps because photography is a single frame, much like a fine art painting, whereas cinema is a language not unlike writing (Maddock & Redulla 2020).[88]

As Engber claims then the best way to consider cinema is as a literacy with functions and rules not unlike the traditional written literacy. Due to cinema's long history, a cinematic reality has been established in the common psyche—one that applies specifically to cinema and is therefore not the same as an individual's reality though it does refer to it. Prince explains this complicated relationship to reality in his article.

> …even unreal images can be perceptually realistic. Unreal images are those which are referentially fictional. 'The Terminator' is a represented fictional character that lacks

> reference to any category of being existing outside the fiction. Spielberg's dinosaurs obviously refer to creatures that once existed, but as moving photographic images they are referentially fictional. By contrast, referentially realistic images bear indexical and iconic homologies with their referents. They resemble the referent, which, in turn, stands in a causal, existential relationship to the image.
>
> A perceptually realistic image is one which structurally corresponds to the viewer's audiovisual experience of three-dimensional space. Perceptually realistic images correspond to this experience because film-makers build them to do so.[89] (Prince 1996, 32)

Importantly, Prince indicates that the perceptual reality of the images is created by filmmakers trying to simulate what the image would look like if captured by a cinema camera: a cinematic reality, the camera's reality. When considering realism specifically the grammar of cinema's images, the cinematography, holds to several tenets. First, cinema conforms to *camera reality*; in other words, the photograph or moving image refers to the subjects and objects within the frame. Secondly, the narrative (content) informs the production of the film (form) just as Jean Baudrillard[90] reflected on the work of cinematographer John Alcott and director Stanley Kubrick to illuminate the film *Barry Lyndon*[91] only with lighting sources available during the period in which the narrative is set, to enhance the sense of reality for the audience. Finally, to further strengthen the visual link of camera reality, it is important that the images include what would normally be considered to be 'defects' associated with the cinema lens's optics or film-stock limitations, such as lens flare or grain. These rules of grammar apply regardless of the method of production. Therefore, the literacy is the same whether it is written with a physical or virtual camera, just as the literacy is the same whether the story is written with a pen on paper or a computer and word processing software.

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