ARS 498: Media Archeology
Final Paper

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Stereoscopy and 3D: Illusions of Reality

Artists throughout the ages and across cultures have often been preoccupied with how to represent the three-dimensional images we see in real life on two-dimensional surfaces. One notable component of this quest for verisimilitude lies in addressing the problem of how to replicate the perception of depth that we experience when we view our surroundings. The effort of representing depth of view has sometimes been cursory, as when the Ancient Greeks use simple shading and/or shadows to suggest the relative volume and distance of objects, or when occlusion (partial blocking of one object by another) is used to give the clue that one object is farther away from the viewer than another. The Renaissance-era discovery of linear perspective and the vanishing point was a major turning point for Western art. When the full range of illusionistic techniques was employed from this point on, a very credible simulacrum of a realistic scene was achieved (Fig 1). Nevertheless, it was not until the 19th century when advancements in the understanding of binocular vision made possible the invention of the stereoscope. This device finally enabled a viewer to have the experience of depth perception when looking at a two-dimensional image.

This paper first sketches out a very brief history of the stereoscope, the many experimental devices it spawned, the invention of cinema and the development of stereoscopic ("3D") films. This overview is provided mainly to highlight the very punctuated history of 3D cinema to the present.

The bulk of this paper, however, consists of an investigation into the many ways that media archeologists and critics view the current state of 3D cinema, both in relationship to stereoscopic experiments of the past and to a future that may include reclamation, innovation, or technical refinement as part of its evolution. The breadth of approaches to conducting a media archeology examination of 3D cinema forms a body of literature that is fragmented but fascinating. Taken together these approaches form a coherent picture of a medium that has always been in flux.

It must be noted that although stereoscopic cinema will be referred to as "3D" throughout this paper, this is shorthand for a product that is, in theory and implementation, really a stereoscopic creation. This distinction will be relevant in some of the discussions that follow, where there is speculation on future developments in the field.

Stereoscopic devices depend on the presentation of two images simulating right and left eye views of an object to a viewer. Each eye sees only the image designed for it, but with both images being in the same location, the brain fuses the images and interprets them as a view of one three-dimensional object. (Approximately 12% of the population does not have the ability to see two images at once, for anatomical or medical reasons, and another 30% of people have weak binocular vision.)

Charles Wheatstone is credited with inventing the first stereoscope in 1838. Though his stereoscope used drawings to demonstrate the effect, his invention nearly coincided with the introduction of the first photographic processes, and it is with photography that the stereoscope and its variants are most closely associated.

Refinements on the stereoscope soon followed, including one by Oliver Wendell Holmes, which he invented because the stereoscopes available to him at the time gave him headaches. It was simple, cheap, and became a very popular invention. Stereoscopy proved to be a very fertile field of investigation, with experimenters such as Muybridge and Marey employing the stereoscopic camera to conduct a variety of experiments on motion, and with the invention of many devices designed to enhance stereoscopic viewing. Among these were devices that made attempts (with varying degrees of success) at animating stereoscopic images.

In 1889 William Friese-Greene was given the first patent on a primitive stereoscopic movie camera. In 1895 the Lumière brothers patented one of the first conventional movie cameras, ushering in the cinematic era. Compared to 2D cinema with its rich, continuous history, the history of stereoscopic, or 3D films is a very choppy one. The first anaglyphic (encoding the image each eye sees in a red or cyan filter) film was made in 1915; the first anaglyphic movie was shown in theaters in 1922. However, the process was expensive and the 1920s generally saw little interest in the medium. There was some resurgence of interest in the 1930s with the invention of the Polaroid 3D process, but WW II put an end to it. However, during the mid-1950s, 3D movies entered a brief "Golden Era", when a number of iconic 3D movies were made. From the late 1960s onward, there were several "resurgences" of 3D movies, mostly catering to interest in the horror, soft porn and sci-fi genres. IMAX began producing non-fiction films in the mid-1980s; their mathematical correctness eliminated eyestrain and the size of the screens on which they were projected offered a very large field of view. Many 21st century 3D

releases have relied on digital and digitized source materials that make possible the conversion of 2D to 3D films, which had previously been seen as an ineffective process. Currently, with the movie industry's need to compete with a plethora of computer-based entertainment, and equipped with an array of increasingly sophisticated techniques, 3D cinema is attempting to become mainstream again.

Towards an Innovated or Renovated Future

It is not surprising that so many media theorists and critics of current 3D movies invoke media technologies of the past to explain the flaws and foibles of its present state and their visions for its future. What is surprising is the wide range of technological forms on which they choose to focus.

Perhaps because of their diverse focuses, critics are split as to how they expect the evolution of 3D cinema to proceed. Some suggest rummaging through discarded technologies for inspiration. Others see 21st century 3D movies as being an interesting embellishment on 2D movies, but one that awaits not gradual improvement or revision. Instead, they believe that only the emergence of a completely different paradigm and/or technology will enable 3D to reach its potential. A third group, not discussed here, is enthusiastic about the current state of 3D cinema and sees in it a rather linear evolution.

Carter Moulton is one of those who examine earlier cinematic works to provide a coherent explanation of the state of modern 3D cinema. In "The future is a fairground: attraction and absorption in 3D cinema", he builds on the work of Lev Manovich, who has written that new technologies often "activate certain aesthetic impulses already established in the past." (p. 3). Moulton explores the influence of

early filmmakers, such as Georges Méliès and the Lumière brothers, on current 3D sensibilities and practices (though some of Moulton's insights could be applied to 2D movies as well).

Moulton distinguishes between "outward aesthetics" — the ability of 3D images to bring the plot (diegesis) into our world — and "inward aesthetics" — their ability to immerse us more deeply in the filmic world. He looks back to their early cinematic roots, in which shock and display (outward aesthetics) are emphasized over narrative in what film critic Tom Gunning terms a "cinema of attraction". Moulton's thesis is that current 3D movies have amplified the emergent effects of shock and display and increased their frequency. He also maintains that the immersive effects of 3D are used in the service of portraying emotional rather than exploring spatial depth.

Most tellingly, Moulton notes that nearly all of the contemporary 3D Hollywood movies are, like their predecessors from the Golden Age of 3D (Fig. 2), action-oriented, representing mainly the genres of excess. They are, in fact, spectacles. Designed to titillate and sell tickets. They continue a tradition harking back to the cinema of attraction. Moulton seems to advocate for a larger repertoire of genres in which 3D is used to expand the narrative and perhaps explore spatial depth.

In contrast, Kristen Whissel discusses the effects of "negative parallax" and "positive parallax" on the viewer, and looks back to 19th century stereoscopic aesthetics to explain current approaches to 3D cinema. In her view, negative parallax — her term Moulton's "outward aesthetics" — is synonymous with

heightened emotions (the affective) and positive parallax (the epistemic) with the desire to see and know. (The profusion of terms used by these theorists can be confusing, but in most cases they are talking about the greater emergent or immersive effects of the 3D experience.)

At first glance, this appears to be the opposite of what Moulton is saying about the emotional effects of 3D on the viewer, but in fact the relationship is more complicated. Whissel uses the movie *Gravity 3D* to illustrate her points. Though Moulton and Whissel wrote their articles just four years apart, Whissel is examining *Gravity 3D,* a movie that does expand the repertoire of 3D cinema by emphasizing the immersive spectacle of a 3D outer space for the surface spectacle of shock and display. In essence, Moulton argues that filmmakers have used the immersive capabilities of 3D to convey depth of emotion while neglecting its capacity to capture spatial depth. But both Moulton and Whissel agree on the heightened emotion and sensation associated with the emergent effects of 3D films.

Whissel suggests that *Gravity 3D* "digitally remediates 19th century stereoscopic 3D aesthetics" (p. 3), but in effect proposes that its use of 3D capitalizes on an insight from the 19th century: namely Oliver Wendell Holmes' observation that the effects of the stereoscope are not so much in opposition to one another as they are opposite poles of its ability to provide the illusion that onscreen objects are tangible and solid. In other words, there is a continuum of 3D effects that hinge on confounding what is seen onscreen with what is felt by the audience. This represents a far more sophisticated use of the technology than most 3D movies have made in the past. It also emphasizes a direction that 3D may exploit in the future.

Parenthetically, Whissel observes that outer space has often been a popular medium for showcasing new media technologies.

Brooke Belisle acknowledges that new technologies often construct a straight chronology from successive past technologies to explain their genealogy. But she posits, in true media archeology form, that exploring alternate and discarded older technologies may teach us much about the true evolutionary path of the new technology and where it may be headed. Belisle parses the relationship between the stereoscopy of the 19th century and 3D cinema on yet a different level. Like Whissel, she sees correspondences between the stereoscope and current 3D cinema. Belisle, however, contrasts what she terms the "spatial depth" of stereoscopes and the "temporal depth" of 3D cinema. When the element of motion is added to an image, as happens in cinema, objects emerge or recede through time. Viewers have always experienced a temporal effect when absorbing the spatial depth of stereoscopic images; cinema has taken the personal control of time from them. The effects of 3D, as noted, extend the illusion already inherent in 2D cinema.

Belisle provides the most comprehensive survey of 19th century stereoscopic experimentation by recounting the large array of optical devices, predating cinema, which attempted to represent the illusion of motion. Wheatstone, who introduced the first stereoscope, soon experimented with hybrid devices that would achieve this effect. The list of motion producing "scopes" invented in the late 19th century is mindboggling. The full list cannot be reproduced here but includes such devices as the stereo-zoetrope, stereo-phenokistoscope, and kinematoscope.

It is in Eadweard Muybridge's motion studies where Belisle finds the greatest resonance with cinematic motion. Muybridge invented the stereo-zoetrope to animate stereo images; used stereoscopic cameras to create the rather clumsy "stereopanoramas" that "supported a temporal merge across stereocards" (p. 10); and made "time studies" that used multiple cameras to present the illusion of a single subject moving through time. Belisle then relates the work of Muybridge to the late 20th century computer-generated effects of new media. Techniques such as "bullet-time" (based loosely on his time studies) and "liquid time" (which recall stereopanoramas) update "stereoscopic ambitions with new capabilities of computing" to play with representation and the relationship of space and time.

Belisle, like Moulton, points out Hollywood's propensity for using 3D cinema as spectacle, amplifying action as a profit-making strategy. But for Belisle, one strategy for reimagining the future of 3D cinema would be to rediscover its past, to look (as she puts it) "for potentials that have been obscured by the apparent cultivation of progress." (p. 17).

This strategy has in fact been implemented by Werner Herzog in his 3D film *Cave of Forgotten Dreams* (2010). Lutz Koepnick suggests, in his essay "Herzog's Cave: Cinema's Unclaimed Pasts and Forgotten Futures", that this movie represents Herzog's "effort to read (media) history against the grain so as to bring cinema's historically suppressed potentiality to life again" (p. 2). Hertzog eschews the goals of "immersion and emergence" that have been fitted into a more or less straight trajectory in the 3D genres of excess, to focus on the capabilities of 3D technology

for creating an experience of heightened attentiveness. Along the way, Herzog is out to recapture the experience of older media.

As he explores the depths of the Chauvet Cave, Herzog makes a visual analogy between the flickering of light and shadows on bodies In motion in the cave paintings and the flickering of early film projectors, cutting to a scene from a 1936 movie, "Bojangles of Harlem", to illustrate this connection. Herzog is looking to elucidate a cinema of hallucination and visions. But Herzog goes much further. By proposing a "Cave Cinema", he is certainly reaching further back into media archeology than anyone else. In Herzog's formulation, caves are seen "not simply as sites of cinema before film but as models to expand cinema beyond its historical evolution" (p. 11). Herzog's visionary conception of 3D cinema also represents a return, says Koepnick, to the cinema of the early 1900s, when it was conceived of as being able to create free-floating representations of life, unmoored from narrative structure. This somewhat disquieting vision of what cinema could be was slowly squelched in favor of the more predictable narrative structure. Of course, there has always been a cinema at the edge, an alternative cinema that has also bucked convention. But this is the aim of Herzog with respect to 3D cinema: to reclaim forms of cinema, and to use novel stereoscopic techniques to do so, in the service of exploring a reality that transcends the mundane.

Perhaps Herzog's vision for 3D content does constitute a desirable future. In the rather more cynical view of Akira Lippit, in "Three Phantasies of Cinema — Reproduction, Mimesis, Annihilation", 3D movies never have and never will fulfill the promise of producing a total representation of real life. He points out that the

stereoscopic camera can only provide an imitation of real depth perception, which is exacerbated by the limitations of projection and screen. Lippit provides a complex analysis of the continuing fantasies of reproduction, mimesis and annihilation inherent in the hopes for 3D cinema, which can only be synopsized here. The 3D movie experience cannot completely represent reality (reproduction), it cannot duplicate reality (mimesis) through total sensory immersion and/or reproduction of the entire field of perception, and it cannot eliminate the screen and with it the separation of audience from the illusion, which would essentially annihilate the concept of cinema itself. Lippit explicitly explores the ahistoricity of 3D, that is, rather than developing in a clear linear progression, 3D cinema has developed in fits and starts, from a hodgepodge of earlier invented technologies. It is neglected, forgotten, always on the verge of returning. In Lippit's opinion, 3D, in whatever manifestation and regardless of any technological advances, is doomed to failure because its goals are inherently artificial and unreachable; they are, in fact, fantasies.

It is perhaps worth concluding this paper with the thoughts not of an academic, but of a director and an artist. The director, Rian Johnson, emphasizes the critical distinction between stereoscopic cinema – what we commonly called "3D" and true three-dimensionality in his critique of its effectiveness. He claims the current "3D" movies deliver not immersion, but distance, not volume but artificial dioramas. The difference between 2D movies and stereoscopically created "3D", he maintains, is analogous to the difference between black-and-white movies and hand-colored ones. Hand coloring has "as much to do with color in the real world as stereoscopic photography has to do with our mind's true perception of depth."

Johnson is waiting for the technological revolution that gives us the experience of true 3D.

It is the artist, Salvador Dali, who will have the last word. Dali became fascinated by stereoscopic images in the 1960s, eventually producing his own "stereoscopic paintings". Not bound by photographic constraints, Dali experimented with painting dreamscapes and surreal scenes of disparate scales and proportions. (It is ironic that the Dali Museum has adapted the mechanisms that Dalí proposed in the 1970s to view his stereoscopic works to the 21st century.) Perhaps the future of 3D cinema's subject matter lies not just in expanding genres but, as it was for Dali, in disrupting the "comfortable optical synthesis in binocular vision" and in giving weight and feeling to the intangible spaces of the imagination.

Image List

Figure 1 – Gustave Caillebotte, *Paris Street, Rainy Day,* 1877. Oil on canvas, 7’10” in × 6.1 in
Art Institute of Chicago, Chicago

Figure2 – House of Wax Movie Poster (1953). 11in x 14 in
Taken from “The future is a fairground: attraction and absorption in 3-D cinema”

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