"This is DCP":
Digital Projection in Repertory Theatres

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Introduction

The declaration of "the death of cinema" has stalked the medium from its beginnings. This assertion has been invoked repeatedly throughout cinema's history, and has been uttered most recently in the context of the ongoing conversion from 35mm film to digital projection. One chief concern in the debate of film versus digital is the current (and future) state of repertory theaters, a unique brand of movie house built around the practice of projecting prints of classic films in their original format. With the advent of Digital Cinema Packages (DCP) as the new standard of motion picture distribution and exhibition, the question of how the advent of this technology will affect repertory cinemas is an important consideration that is often overlooked.

To that end, this paper will explore to what extent the conversion to DCP is altering the landscape of repertory cinemas in New York City, and some of the broader implications that this conversion poses. A brief history of the advent and development of the repertory cinema movement in New York City will provide a background for this discussion, lending insight into the changes and transitions repertory theatres have undergone over the years. A discussion of the repertory cinema's traditional function as a content provider of historical material lends itself to an analogy between repertory theatres and museums, which will be considered in light of concepts of historical exhibitions and cultural consumption. In order to address the subject of digital cinema projection in repertory theatres, this paper will provide a brief history of the roots of digital cinema, examining the technology that underpins the advent of digital cinema and its projection. Finally, this paper will address the exhibition and distribution of repertory film on DCP in order to explore some of the theoretical implications inherent to DCP technology, allowing the impact of a wholesale conversion to digital projection to be brought to light.

History of Repertory Cinemas in New York City

Repertory cinemas (or revival houses) in America have had a long, checkered history marked by periods of both popularity and decline, and repertory cinema in New York City proves no exception to these trends. The re-discovery of classic films was due in large part to the advent of broadcast television. Hollywood studios, which had been battling decreasing cinema attendance figures since 1946, began to sell or lease older films for television broadcast in a bid to fill some of the many hours that television studios needed to schedule.[1] As film historian Douglas Gomery explains, "through the mid-1950s all the major Hollywood companies released their pre-1948 titles to television," and feature film presentations on television quickly become, "one of television's dominant programming forms."[2]

Films were distributed on 16mm to television stations desperate to affordably fill empty blocks of time for a content-hungry audience. Many of these films and some of their stars had been forgotten over time, as theatrical distribution of feature films tended to end mere months after initial exhibition. "The Late, Late Show" and other programs of its type would air black-and-white films from the 1930s and 1940s, several decades after they had been withdrawn from circulation, resulting in renewed appreciation of a Hollywood that would soon vanish with the dissolution of the studio system and Hayes Code (soon to be replaced by the MPAA ratings system in 1968).

This growing admiration for auteurs like Hitchcock and Hawks, Wilder and Welles, resulted in what is now commonly referred to as the "cinéphile generation"—young men and

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[1] Sklar, Robert. "The Disappearing Audience and the Television Crisis." *Movie-Made America: A Social History of American Movies*. New York: Random House, 1975. 269-85. Print. p. 276.

[2] Gomery, Douglas. "Movies on Television." Museum of Broadcasting Communications. Web. 29 Nov. 2011.

women were inspired by these films to pursue careers in filmmaking, which in turn lead to the development of cinema study programs in several national universities.[3] Specific to the city of New York were and are New York University and Columbia University, and their locations near Greenwich Village and the Upper West Side, respectively, contributed notably to the development of revival houses in those neighborhoods. Older generations of film fans became frequent patrons of repertory theaters as they began programming films remembered from the pasts of now-grown movie lovers of the 1930s and 1940s.

However it was the new cinéphile generation, fascinated by all aspects of film history, whose attendance drove the new trend of repertory programming. In the pre-video era, revival houses were one of the only outlets for the discovery of classic films, and their popularity increased through the 1960s and into the 1970s.

Repertory Cinemas in New York City in the 1960s and 1970s

A complete survey of every repertory theater in the city, which would also include independent/art house theaters that frequently booked studio-driven re-releases (i.e., Cinema Studio, the Metro, the Paris, the Embassy), is outside the scope of this paper. However, the following revival houses were crucial in the development of repertory programming in New York City, and serve as an interesting contrast to the current repertory cinemas in operation. Most of the information, including the addresses of the theaters, was collected from the website Cinema Treasures, a comprehensive database of national theaters.

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[3] Fischer, Craig. "Films Lost in the Cosmos: Godard and New York Distribution (1961-1973)." *Spectator - The University of Southern California Journal of Film and Television*. Spring-Summer 1998: 47-66. 1 May 2012.

The Thalia (250 W. 95th Street), perhaps most famous for its appearance in *Annie Hall* (1977), opened in 1931 as an Upper West Side neighborhood movie house before transitioning into repertory programming in the late 1960s. Late programmer Richard Schwartz, one of the most important figures in New York rep cinema, programmed a wide variety of classics, from foreign favorites (*8 ½* (1963)*, Black Orpheus* (1959)) and obscure B-movies (*Queen of Outer Space* (1958)*, Bride of the Monster* (1955)) to Marx Brothers comedies and forgotten films of Hollywood stars (Bogart's obscure comedy *The Stand In* (1937) was double billed with the more popular *African Queen* (1951)).[4] Schwartz opened a satellite location, the Thalia Soho (15 Vandam Street), in 1984, largely programming films based around his extensive private print collection.

The New Yorker Theater (2409 Broadway), also featured in *Annie Hall*, began life as the Adelphi in 1917 before changing names to the Yorktown in 1933 and finally the New Yorker in 1960. Theater owner Dan Talbot spun off his own theatrical distribution arm, New Yorker Films, which outlived its theatrical namesake. Like the distributor, the New Yorker focused primarily on foreign imports, debuting Visconti and Ophuls films to American audiences, but also revived many classic films for eager repertory followers, including Buster Keaton silent comedies, Billy Wilder noirs, and Busby Berkeley musicals. It was unique among New York's repertory theaters in distributing critical essays about the films it exhibited, often specially commissioned for the repertory screenings.[5]

The Bleecker Street Cinema (144 Bleecker Street), initially owned by documentary filmmaker Lionel Rogosin, opened its doors in 1962, exhibiting foreign, avant-garde, and

[4] Cinema Treasures. <http://cinematreasures.org/theaters/285>
[5] Columbia University Press. "Archives from the New Yorker Theater." Oct. 2009. Web. 9 May 2012. <http://cup.columbia.edu/static/talbot>

independent cinema (Kenneth Anger's 1964 film *Scorpio Rising* premiered here). Francois Truffaut claimed this as his favorite New York City theater, which was also the home base for publication of independent cinema magazine *The NY Film Bulletin*. In keeping with its initial interest in foreign imports, many of the repertory classics, often screened as part of extensive retrospectives, were of the Renoir, Godard, Kurosawa, Ozu, Visconti, and Antonioni variety, though English-speaking auteurs such as Altman, Chaplin, and Hitchcock were more than welcome.[6]

The Elgin (175 8th Avenue) opened in 1942 and went through a number of transformations, from first-run films in the 1940s to Spanish language features in the 1950s to its incarnation as a repertory theater in the 1960s and 1970s. The Marx Brothers were popular repertory residents at the Elgin, as was Toshiro Mifune and Buster Keaton. It also revived films for midnight screenings, including the films of Jayne Mansfield and more contemporary features like *The Harder They Come* (1972) and *El Topo* (1970). It was also one of the few theaters in the city, and perhaps the country, with the ability to screen Cinemascope features like *Lawrence of Arabia* (1962) and *It's a Mad, Mad, Mad, Mad World* (1963).[7]

The Regency (1987 Broadway) opened in 1931, and throughout the 1960s, 1970s, and well into the 1980s featured crowded repertory programs curated by now-legendary Frank Rowley. Retrospectives were often built around popular stars like Bette Davis, Joan Crawford,

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[6] Cinema Treasures. <http://cinematreasures.org/theaters/6016>

[7] Cinema Treasures. <http://cinematreasures.org/theaters/6353>

Judy Garland, and Jennifer Jones, or popular themes like the MGM musical, Warner Brothers in the 1930s, or Fox Cinemascope films.[8]

The 8th Street Playhouse (52 W. 8th Street) opened in 1929 as the First Guild Cinema before changing its name in 1930. It was the first theater in New York to revive classic 3-D films, many never seen since their original runs in the 1950s, in an early-1980s retrospective that packed the house nightly, and one of few theaters to program repertory drive-in and exploitation fare in "Sleaze Festivals".[9]

The Carnegie Hall Cinema (881 7th Avenue) began operations in 1961 and by the early 1970s had settled into repertory programming, due in large part to the fact that it was under the same management as the Bleecker Street Cinema. The Carnegie's programming included Brando, Hitchcock, James Bond, W.C. Fields, and silent film festivals, alongside the odd contemporary adult feature, and they continued down this path through the late 1980s.[10]

The Cinema Village (22 E. 12th Street) opened in 1963 and re-invented itself a year later as an art theater that also specialized in repertory programming, usually festivals devoted to the work of specific directors like Scorsese, Godard, or Peckinpaugh.[11] Theater 80 St. Marks (80 St. Marks Place), opened in 1971 by owner Howard Otway, was unique in that it used rear

[8] Cinema Treasures. <http://cinematreasures.org/theaters/1199>

[9] Cinema Treasures. <http://cinematreasures.org/theaters/4699>

[10] Cinema Treasures. <http://cinematreasures.org/theaters/6011>

[11] Cinema Treasures. <http://cinematreasures.org/theaters/2079>

projection because of its small space, and usually relied on 16mm prints over 35mm for its double features of Marlene Dietrich, James Cagney, 1930s musicals, and 3-D films.[12]

Repertory programming at this time almost exclusively relied on 16mm prints from television stations or private collectors. Eventually deals were struck with studios and independent distributors like Janus Films to rent 35mm theatrical prints, leading to a renewed appreciation for Technicolor, Cinemascope, original 3-D, and other theatrical systems that had been forgotten over time and could never be replicated on television. Films neglected or ignored on original release, such as *King of Hearts* (1965) and *Harold and Maude* (1971), found new audiences in repertory theaters. Directors like Ozu, Sirk, and even sexploitation maverick Russ Meyer developed new followings, and they work began to draw academic and critical attention years after initial distribution.[13] The 1960s through the 1980s was the golden age of repertory cinema.

However, since their introduction to the landscape of New York City cinemas, the popularity of repertory cinemas has been unsteady. Few revival theaters could survive without programming contemporary titles with the classics. Even before the perceived threat posed by digital cinema to the rep cinema scene, the arrival of home video became a very vivid menace to theatrical exhibition of classic films. Purchasing an affordable home video version of a classic film became preferable to going out and seeing it in a theater. As former Bleecker Streer

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[12] Cinema Treasures. <http://cinematreasures.org/theaters/4698>

[13] Cinema Treasures. <http://cinematreasures.org/comments?page=3&theater_id=6353>

programmer Jackie Raynal put it, "Why bother to leave your house and buy an expensive ticket in a theater to see a good film?"[14]

Another important issue effecting repertory programming was the availability of prints. With the advent of video came declining interest by studios in maintaining their theatrical print elements, mainly due to storage cost concerns. Theatrical prints were jettisoned in favor of maintaining video masters, which were much more affordable to store. Print exchange depots began to close, leading to scarcity of materials for booking repertory films, and studios could not justify costs of producing new prints for what was becoming a financially risky business. Coupled with Manhattan rent hikes, a constant issue for small businesses in the city, revival houses began to fade from view in the 1980s.[15]

Changes in Repertory Cinemas in New York from the 1980s to Today

In 1977 the Elgin was one of the earliest to close after the rise in cost of print rentals from the studios. It briefly revived itself to become a porno house before the pressure from the surrounding neighborhood forced its second closure in 1978. Today its renovated space is now the Joyce Theater, a dance performance hall.[16] The New Yorker Theater was purchased by the Walter Reade Organization in 1972 and continued as a repertory house until Walter Reade filed for bankruptcy in 1977, after which it became a first-run commercial venue, eventually shutting

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[14] Rapfogel, Jared. "Repertory Film Programming." *Cineaste*. Spring 2010, Vol. 35 Issue 2: 38-53. New York. 8 April 2012.

[15] Haines, Richard W. *The Moviegoing Experience, 1968-2001*. Jefferson: McFarland Press, 2003. 168-172. Print.

[16] Cinema Treasures. <http://cinematreasures.org/theaters/6353>

its doors in May 1985.[17] The Thalia closed in 1987, although it has since re-opened, with

Leonard Nimoy's name attached, as part of Symphony Space, whose complex now stands where

the old theater used to.[18] Sister site Thalia Soho closed soon after in 1990; it briefly served as a

space for another rep cinema, Bleecker Street Cinema co-owner Jackie Raynal's Le

Cinematheque in 1992 before that venue closed a year later. The location is now home to off-

Broadway theater Soho Playhouse.[19]

The same year the Thalia closed the Cineplex Odeon Corporation took control of the

Carnegie Hall Cinema and made it a prestigious first-run theater until its closure in the early

1990s.[20] The Cinema Village transformed into a first-run independent film house in the late

1980s and is still in operation today.[21] The Regency followed suit in 1987 before also being

purchased by Cineplex Odeon a year later.[22] Other first-run competition forced it to cease

operations in 1999.[23] The 8th Street Playhouse was taken over first by United Artists in 1988, and

then the City Cinemas Corporation in 1989; the latter attempted one last gasp of revival

programming before closing down completely in 1992.[24] The Bleecker Street Cinema, due to a

[17] Balio, Tino. *The Foreign Film Renaissance on American Screens, 1946-1973*. Madison: University of Wisconsin Press, 2010. 301. Print. pp. 301.

[18] Kaufman, Anthony. "A Space Odyssey." *The Village Voice*. 9 Apr. 2002: 122. Print. 1 May 2012.

[19] Cinema Treasures. <http://cinematreasures.org/theaters/8373/comments>

[20] Cinema Treasures. <http://cinematreasures.org/theaters/6011>

[21] Cinema Village. 2006. Web. 7 May 2012. <http://www.cinemavillage.com/chc/cv/about_us.asp>

[22] Canby, Vincent. "Black, White and Beautiful." *The New York Times*. 10 April 1988. Web. 9 May 2012. <http://www.nytimes.com/1988/04/10/movies/film-view-black-white-and-beautiful.html>

[23] Cinema Treasures. <http://cinematreasures.org/theaters/1199>

[24] Cinema Treasures. <http://cinematreasures.org/comments?page=4&theater_id=4699>

"sharp rent increase", succumbed to the inevitable and shut its doors on September 2, 1991.[25] Its space was briefly inhabited by Kim's Underground Video from 1998 to 2000, a symbolic occupation if there ever was one. Following the death of Otway in 1994, Theater 80 St. Marks ceased exhibiting films, becoming a theater venue thereafter.[26] Until its closing, it had been the longest continuously running revival house in the city.[27]

The Biograph Cinema (225 W. 57th Street) represented an interesting attempt to bring revival houses back to New York. The theater, running since 1961, tackled repertory programming curated by Rowley (at that time late of the Regency) beginning in 1988 until, once again, Cineplex Odeon "pulled the plug" on the operation in 1991.[28]

Under the helm of the Thalia's former repertory programmer, Bruce Goldstein, Film Forum was one of the few repertory cinemas to survive the 1980s. Opened in 1970, it has changed locations several times, including 80 Wooster Street from 1970-1975, 15 Vandam Street from 1975-1980 (the Thalia Soho would take the space in 1984), and 57 Watts Street from 1980-1989. Since moving to its current location at 209 W. Houston Street, Film Forum has remained the foremost revival house in New York City.

The state of repertory cinemas in New York is tremendously different today from its - early years. When asked by the authors about current repertory theaters in the city, Bruce

[25] Honan, William H. "Bleecker Street Cinema Closing." *The New York Times*. 28 Aug. 1991. Web. 9 May 2012. <http://www.nytimes.com/1991/08/28/movies/bleecker-street-cinema-closing.html>

[26] Cinema Treasures. <http://cinematreasures.org/comments?page=3&theater_id=4698>

[27] Obituary. "Howard Otway, 72; Ran Revival Theater." *The New York Times*. 21 April 1994. Web. 9 May 2012. <http://www.nytimes.com/1994/04/21/obituaries/howard-otway-72-ran-revival-theater.html>

[28] Cinema Treasures. <http://cinematreasures.org/theaters/6573/comments>

Goldstein replied, "What do you mean? There aren't any."[29] Many venues now referred to as "rep cinemas" in New York are housed within other institutions (museums, community centers, performance centers, archives), which do not function solely as movie theaters. To illustrate the changes to repertory cinema in New York since the 1980s, this is a brief overview of the current institutions in the city offering repertory programming.

The Museum of Modern Art (MoMA) (11 W. 53rd Street), developed and opened in 1928-1929, founded its film department in 1935, becoming one of the first film libraries on American shores. The museum began exhibiting films almost immediately after the film department began, and continued to host a large number of repertory series and programs in its three movie theaters.[30] Anthology Film Archives (32 2nd Avenue), like MoMA, was not established to provide a continuous variety of repertory programming. Formed in 1969 and opened in 1970 by five independent filmmakers (Jonas Mekas, Jerome Hill, P. Adams Sitney, Peter Kubelka, Stan Brakhage), the Archives was established as a kind of museum for avant-garde cinema, central to which was and is the Essential Cinema collection, made up of 330 titles selected for their importance to cinematic history. The concept of only screening these 330 titles in rotation was soon expanded to include spotlights on other filmmakers, typically of the avant-garde variety, but programs have been curated that feature classic films of many different varieties.[31]

BAM Rose Cinemas (30 Lafayette Street, Brooklyn) emerged from the Brooklyn Academy of Music in 1998, and introduced repertory programming to its calendar in 1999,

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[29] Goldstein, Bruce. Personal Interview. 27 April 2012.

[30] Wasson, Haidee. *Museum Movies*. Berkley and Los Angeles: University of California Press, 2005: 195-207. Print.

[31] Anthology Film Archives. 2012. Web. 7 May 2012. <http://www.anthologyfilmarchives.org/>

curated by its long-time programmer Florence Almozini. Even earlier was the opening of the Walter Reade Theater (165 W. 65th Street) by the Film Society of Lincoln Center in 1991, curated by Richard Pena since its inception.[32]

Museum of the Moving Image (36-01 35th Avenue, Astoria) (MoMI) opened in 1988 and soon after began screening films, both repertory and contemporary, expanding their repertory programming after a 2010 renovation.[33] Unlike MoMA and Anthology Film Archives, MoMI does not have a film collection of its own to draw on, relying on distributors and print collectors to supply materials. The Museum of Arts and Design (2 Columbus Circle) (MAD) entered the repertory cinema scene in 2008 following a renovation and relocation. The same year, 92Y Tribeca (200 Hudson Street) expanded out of a community center to include, among other arts events, repertory film programming.[34] Finally, first-run independent theaters IFC Center (323 6th Avenue) and Landmark Sunshine (143 E. Houston Street) have started programming special repertory events, such as midnight movies and weekend classic screenings. Film Forum's Goldstein has maintained over the years that "audiences still want to see [classics] in theaters. Let's face it, people want to go out."[35] The continued presence of repertory cinemas in New York City clearly demonstrates they do.

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[32] Sluis, Sarah. "Reviving Cinema." *Film Journal International*. Jan. 2009: 16-26. Print. May 2012. p. 16.

[33] Museum of the Moving Image. 2012. Web. 7 May 2012. <http://www.movingimage.us/about/history>

[34] Museum of Arts and Design. 2012. Web. 9 May 2012. <http://www.madmuseum.org/>

[35] Kaufman, Anthony.

Repertory Cinemas as Museums

During an interview with the authors, Goldstein expressed dismay when presented with the analogy between repertory cinemas to museums, and responded by saying, "we try not to make Film Forum feel like a museum, we try to make it like a movie house."[36] Despite Goldstein's reservations, the comparison is apt and may help illustrate the institutional value of repertory cinemas in a rapidly changing landscape. Aside from the fact that several repertory cinemas in New York City are extensions of actual museums (MoMA, MoMI, MAD), there are many distinct similarities between the two kinds of institutions, which this paper will explore at some length below in an attempt to bring to light.

The very word "classic" insinuates a sense of history and the past to the object of the descriptor. When the first repertory cinemas were being established, it was partially in the interest of educating the cinéphile students who made up the vast majority of initial repertory audiences. As a result, repertory cinemas have always served an educational purpose in addition to their existence for the sake of entertainment. Like a museum, the rep cinema is a place to learn about film, its history, and its value, through displays (screenings) of historical context. Even the term "curator", often used in the world of artistic institutions (museums, galleries), has been applied to repertory cinema vocabulary, becoming interchangeable with "programmer" to describe the person in charge of scheduling and putting together series (exhibits). Furthermore, like museums that exhibit authentic historical materials, repertory cinemas rely on "antique" elements (film prints) to draw in attendance.

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[36] Goldstein, Bruce.

Like museums that feature series of exhibits, rep cinemas schedule their classic films for limited time engagements, in some cases a one-time only screening or brief one or two-week bookings. This sense of urgency is found in exhibits of art or historic artifacts. Related to the limited time engagement is the practice of loaning materials from institutions. The Met may have an exhibit of paintings on loan from a European gallery or museum for a set period of time, after which they must promptly return them; Film Forum rents a print of *The Gang's All Here* (1943) from 20th Century-Fox, a studio that ships materials under the stipulation that the film will be exhibited for a set period of time, then promptly returned. Both institutions are also expected to pay insurance for the materials in transit, and install the artifact properly on arrival.

Both museums and repertory cinemas have promotional departments that exist to develop relationships with their users through outreach. A promotional department in either a museum or a repertory cinema will cultivate mailing lists, which they will use to inform interested patrons of future exhibits and programs. Connected to the promotional department is the concept of membership (sometimes the purpose of a solely dedicated membership department). Users who become members will receive additional benefits (discounted or free admission, notifications of members-only events, etc.), further strengthening the relationship between the user and the institution.

In addition, in New York City the similarity between prices of admission to repertory cinemas and museums deserves mention. Not altogether unrelated, the presence of gift shops (or the availability of exhibition-related ephemera) and café/confessions further draws the comparison.

Finally, museums and repertory cinemas face a common dilemma: staying relevant. Maintaining a regular influx of users is essential to the lives of museums as well as repertory cinemas, and it proves a regular challenge to appeal to a wide range of users. Where museums may offer contemporary art or exhibits to off-set the content of the past, repertory cinemas, even from their beginnings, have included new releases on their schedule, not solely relying on the classics to draw in patrons.

How does DCP change this paradigm, if at all? With the advent of DCP, can films still be considered "historical objects," or is their translation from an analog to a digital format irrelevant to repertory theatres, whose mission it is provide content regardless of its format? In order to approach these questions, a more in-depth exploration of the principles and technologies upon which digital projection is based will be discussed below.

The Roots of Digital Cinema: "Visualizing the Invisible"

Any discussion of DCPs must first begin with a discussion of how digital cinema works more broadly. However to approach an understanding of this subject, it is crucial to briefly consider where it came from. To that end, digital cinema's roots in computer graphics, or computer generated-images, will be explored.

From its official inception in 1925 Bell Labs fostered an atmosphere of creativity and collaboration between artists and scientists.[37] According to Bell Labs historian Jon Gertner, Bell employees had a remit to investigate, "anything remotely related to human communications,

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[37] Gertner, Jon. The Idea Factory: Bell Labs and the Great Age of American Innovation. New York: Penguin, 2012. Print. p. 3.

whether it be conducted through wires or radio or recorded sound or visual images."[38] The broadly defined parameters of their research coupled with leadership that valued creativity, experimentation, and interdisciplinary collaboration amongst its scientists[39] set the stage in the early 1950s for a series of experiments using new programming languages to harness the creative capacity of digital mainframe computers in the service of scientific imaging.

During the 1950s, a pioneering group of scientists at Bell Labs became interested in using computer technology to generate graphic images—to "make 'pictures' of data,"[40] according to computer science historian Wayne Carlson. The data they were interested in visualizing were typically two and three-dimensional computer-generated images representing complex equations, multidimensional data, and information sets. Computer scientist Kenneth Knowlton describes these images as, "logically easy to define, but which might be too difficult, if not impossible, to render by hand."[41] However by using programming languages that could be 'understood' by a corresponding program, computer scientists could 'instruct' a computer to produce an animated simulation of these phenomena, which included weather patterns, architectural models, and the principals of Newtonian physics.

The computer-generated images that these computer scientists created lay the foundations for digital cinema by establishing three important principals about its recording, representation, and storage. First, and perhaps most importantly, these simulations established the notion that an image could be generated digitally, using binary. Binary, or digital processing, explains Brian

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[38] Ibid. p. 32.

[39] Ibid. p. 31

[40] Carlson, Wayne. "A Critical History of Computer Graphics and Animation." *A Critical History of Computer Graphics and Animation: Section 1 : The History of Computing Technology*. Ohio State University, 2003. Web. 17 Mar. 2012. <http://design.osu.edu/carlson/history/lesson1.html>.

[41] Knowlton, Kenneth C. "Computer Films." *Filmmakers Newsletter* 4.2 (1970): 13-18. Print. p. 14.

McKernan, editor of *Digital Cinema* magazine, "reduces all information—including pictures—to a series of 1's and 0's."[42]

Creating images using this technology represents a significant departure from typical photochemical methods. In traditional photography, a lens is used to focus the light reflected from objects into an image that is recorded on a light-sensitive surface (usually film), typically comprised of minute silver halide crystals suspended in a gelatin. When the light strikes the halides a chemical reaction occurs, transforming the light-sensitive particles into metal. During development, chemicals wash away the unexposed silver halides and the latent image becomes fixed as a metallic index of the original. Thus, film is described as *analog* because it is a physical representation of the real images it represents.

However digital cinema, "takes periodic samples of information along that wave and assigns (quantizes) the information into a series of 0's and 1's. This *coded* information is then divided up into *bits*, one either of which makes a unit known as a *byte*."[43]

This "pulsing stream of bits and bytes"[44] that comprises the original image is ultimately collected in a file that resides on a computer server, which is stored using random-access memory (RAM). The concept of images being stored in a digital file rather than as a physical analog was radical, and represents the second crucial principal of digital cinema established by these early experiments in scientific imaging.

The final principal established by these experiments was the concept of the pixel (or "picture element"), which allowed the stored binary information to be translated back into a

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[42] McKernan, Brian. *Digital Cinema: The Revolution in Cinematography, Postproduction, and Distribution*. New York: McGraw-Hill, 2005. Print. p. 16-17

[43] Ibid. p. 17-18.

[44] Lunenfeld, Peter. "Introduction." *The Digital Dialectic: New Essays on New Media*. Cambridge, MA: MIT, 2000. Print. 7.

visual image on a computer screen. A pixel is a minute area of illumination on a display screen that is, according to computer graphics historian Dan Ryan, "a sample of an original image, where more samples typically provided a more accurate representation of the original."[45] The bits and bytes that contain the information necessary to create a digital image are mapped on pixels, or points of light on a screen. The greater the number of pixels a computer is able to generate in addition to the number of bits and bytes that comprise the image information (the image's file size) work together to determine the image's resolution.

While these principals have become ubiquitous in the decades since these experiments, demonstrating that it was possible to generate, store, and represent moving images this way opened up new avenues of possibilities for digital imaging, re-shaping how people thought about and understood moving images. This transformation is perhaps most evident in Gene Youngblood's seminal 1970 text *Expanded Cinema*. In it, Youngblood devotes an entire section to arguing for a broader understanding of cinema to include "Cybernetic Art and Computer Films," concluding that digital art made possible a new way of seeing by allowing artists to "visualiz[e] the invisible,"[46] thereby "extending man's communicative capacities beyond his most extravagant visions."[47]

The Roots of Digital Cinema: Charge-Coupled Devices

As scientific imaging advanced throughout the 1960s, scientists and computer artists found newer, more efficient ways of using digital technology to make images. The variety of computer-

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[45] Ryan, Dan. *History of Computer Graphics*. Bloomington, IN: Authorhouse, 2011. Print. DLR Associates Ser. p. 34.

[46] Youngblood, Gene. *Expanded Cinema*. New York: Dutton, 1970. Print. p. 190.

[47] Ibid. p. 41.

generated images grew, and in 1974 the Association of Computing Machinery's Special Interest

Group on Computer Graphics and Interactive Techniques was formed,[48] providing a forum that

enabled computer scientists to share their research in the field. However while computer-

generated imaging continued to improve, it was not until the invention of the charge-coupled

device in 1969 that scientists found a way of recording and representing the real word digitally.

The charge-coupled device (CCD), invented at AT&T Bell Laboratories by Willard

Boyle and George E. Smith, is a semi-conductor that is designed to convert an electrical charge

into digital values.[49] The invention capitalized on Einstein's discovery of the photoelectric effect,

allowing the light reflected from objects to be translated by the CCD into a series of electrical

charges, which in turn are converted to binary within the CCD.[50] Lightweight and measuring

several inches square, the CCD revolutionized digital imaging by providing a compact,

functional system for recording and storing pro-filmic actuality in digital form.

CCD technology was seized upon immediately. Fairchild Imaging licensed Bell's patent

on the technology, producing the first commercially available CCD in 1973.[51] Eight years later,

using Fairchild's 100 x 100 pixel CCD prototype, Kodak made history by producing the first

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[48] SIGGRAPH ACM Special Interest Group on Computer Graphics and Interactive Techniques. *SIGGRAPH '74 Proceedings of the 1st Annual Conference on Computer Graphics and Interactive Techniques*. New York: ACM, 1974. Print.

[49] Boyle, Willard Sterling, and George Elwood Smith. Information Storage Devices. Bell Telephone Laboratories, Incorporated, assignee. Patent 3,858,232. 31 Dec. 1974. Print.

[50] Tompsett, Michael F., Gilbert F. Amelio, Walter J. Bertram, Jr., Reginald R. Buckley, W. J. McNamara, James C. Mikkelsen, Jr., and David A. Sealer. "Charge-Coupled Imaging Devices: Experimental Results." *IEEE Transactions on Electron Devices*. November 18.11 (1971): 992-96. Web. p. 992.

[51] Peres, Michael R. The Focal Encyclopedia of Photography: Digital Imaging, Theory and Applications, History, and Science. Amsterdam: Elsevier/Focal, 2007. Print. p. 16.

electronic CCD still image camera.[52] Although the device was rudimentary by later standards and not ready to be put into widespread distribution, the advent of the digital still image camera paved the way for further innovation throughout the next several decades to produce digital cinema technology capable of recording moving images instantaneously.

The Advent of Digital Video

While a full survey of the technological developments within the realm of digital cinema is beyond the scope of this paper, a discussion of the advent of digital cinema cannot escape mention of digital video. In the late 1970s and early 1980s scientists began a series of experiments that focused on digitizing video signals. The research and development of digital video occurred at the behest of film producers eager for a video technology that would enable consistent image quality, even after duplication.[53] Digital technology provided a natural solution because, unlike analog formats, a digital file is capable of being copied exactly without any image deterioration.

Sony Corporation was at the forefront of the research and development for digital video, and in 1987 they introduced the first component digital videotape recorder—the Sony D-1.[54] The D-1 allowed image data to be captured using video technology, digitized within the camera, and subsequently converted back to standard analog video format in order to be viewed. The arrival of digital video sparked a series of rapid innovations that quickly improved image

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[52] Sasson, Steve. "We Had No Idea." *Plugged In*. Eastman Kodak, 16 Oct. 2007. Web. 09 May 2012. <http://pluggedin.kodak.com/pluggedin/post/?id=687843>.

[53] Sony Corporation. "The Beginning of the Digital Age." *Sony History*. Sony Corporation. Web. 10 May 2012. <http://www.sony.net/SonyInfo/CorporateInfo/History/SonyHistory/2-04.html>.

[54] Ibid.

quality,[55] and by the mid-1990s digital video had become a ubiquitous component of the post-production process.[56]

Digital Cinema and George Lucas

By the mid-1990s the use of commercial digital still camera technology had become widespread, and professional grade digital video technology was commonly used for a number of different post-production purposes in the film industry. Typically films would be shot on 35mm film, scanned at high resolutions for post-production, and then printed on 35mm film again for its release. However as the post-production workflow became increasingly dependent on the use of digital tools, and as new technological milestones were reached,[57] many filmmakers began to envision a future that would eliminate the use of film altogether.

Foremost among this group was George Lucas. From the beginning of his career Lucas had been involved in the development of cutting-edge technologies as tools of expression, and by the mid-1990s Lucas was convinced that the future of filmmaking depended upon developing an all-digital workflow. In 1996 he sent a letter to Sony, a pioneer in the field of digital video since the 1980s, seeking to make digital cinema a reality.

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[55] It is important to note that the research and development of digital video technology was also due in large part to the skyrocketing popularity of commercial digital still cameras, which in turn fuelled advances in bit-depth and bit-mapping. According to Peres, In 1995 alone, more than 35 new digital cameras models were released worldwide; the following year, the number of new models introduced increased to 67; and in 1997, there were an additional 156 new models introduced. Peres, Michael R. p. 17.

[56] Digital video yielded a file that could be easily manipulated, which made it an ideal tool for a number of post-production processes, including special effects, digital editing, and digital color grading.

[57] In 1995 Pixar made history by releasing *Toy Story*, the first feature length computer-generated film.

Lucas' letter to Sony has become a sort of foundational myth for digital cinema, and is cited in numerous textbooks as the genesis of this technology. "It's hard to say exactly when the digital cinema revolution began in earnest," Mckernan says, "but George Lucas' 1996 letter to Sony's research center in Atsugi, Japan probably provides the best historical starting point."[58] While many, including SMPTE Governor Charles Swartz, have pointed out that in reality the transition to digital cinema had already been underway for more than twenty years prior to Lucas' letter,[59] the impact of Lucas' inquiry did indeed represent a turning point.

Sony had been manufacturing an 1125 line analog High Definition Video System since the mid-1980s, and although it had been used for some feature film production,[60] by and large it had been intended as a broadcast format. McKernan adeptly sums up the limitations of this technology as a viable option for film production as follows:

> [HDVS'] 30-frame/60-field interlaced recording format produced substandard images when converted to motion-picture film for theatrical exhibition. Unlike video for television, motion-picture film frames are *progressive*; they are displayed one at a time, as opposed to being split into even- and odd-numbered lines and displayed in "interlaced" fashion. Also, movie film is displayed at a rate of 24 frames each second. The interpolation required to convert 30-frame/60-field interlaced video to 24-frame-per-second 35mm film typically produces image "artifacts" that audiences find distracting.[61]

In his letter to Sony, Lucas requested a camera capable of using progressive scanning and shooting at 24 frames per second in order to produce an image with a quality commensurate with 35mm film. Sony complied, producing a digital HD video prototype of what would become the

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[58] McKernan, p. 27.

[59] Swartz, Charles S. *Understanding Digital Cinema: A Professional Handbook*. Amsterdam: Focal, 2005. Print. p. 35.

[60] Peter Del Monter's *Julia and Julia* (1987) was the first full length feature film to be shot using HDVS technology.

[61] McKernan, p. 28.

HDW-F900 digital 24p CineAlta.[62] The technology met with excitement in Hollywood and was quickly integrated into the workflows of several major Hollywood productions. Released on May 16, 2002, Lucas' *Star Wars Episode II: Attack of the Clones* became the first Hollywood feature film to be entirely shot, edited, and released using an entirely digital workflow.

Digital Cinema Standards

Even before *Attack of the Clones'* theatrical debut, it was clear there was no turning back: digital cinema had arrived. As early as 2000 SMPTE began to create a set of industry standards for digital cinema, citing a mutual desire for standards from both content creators and exhibitors.[63] The standards process immediately proved challenging because of the distinct interests of the various groups involved. "Digital cinema has in essence three major stakeholder groups, and untold numbers of sub-stakeholders," explains Swartz. "The content providers (studio distributors), the content presenters (exhibition), and equipment manufacturers form the three major groups. In just about any area of digital cinema these three groups have divergent needs and desires, thus creating opposition of some form at every turn."[64]

Perhaps the most marked divide in this process was between the National Alliance of Theatre Owners (NATO) and the Digital Cinema Initiative (DCI), a consortium of the major Hollywood studios (Disney, Fox, Paramount, Sony Pictures Entertainment, Universal and

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[62] Sony Corporation. "CineAlta Brochure." Sony Corporation. Web. 11 May 2012. <http://www.panavision.co.nz/main/kbase/downloads/hdw-f900.pdf>.

[63] Society of Motion Picture & Television Engineers. "Status Report: D-Cinema Technology Committee (DC 28)." Society of Motion Picture & Television Engineers, 19 Oct. 2000. Web. 11 May 2012. <https://www.smpte.org/sites/default/files/files/DC_Belmer.pdf>.

[64] Swartz, p. 189.

Warner Bros. Studios). The DCI was established in March 2002, with a primary objective, "to establish and document voluntary specifications for an open architecture for digital cinema that ensures a uniform and high level of technical performance, reliability and quality control."[65] In December of that year the DCI announced that The Entertainment Technology Center at USC's Digital Cinema Laboratory had been named by DCI as the official site to test digital cinema technologies. Described as, "a neutral research center funded by Hollywood studios and high tech companies and dedicated to evaluating new entertainment technologies," the Entertainment Technology Center was tasked with providing the research for a set of industry standards that would be, "scalable into the future."[66]

In July 2005 the DCI released the Digital Cinema System Specification version 1.0. The DCI's System Specification, updated regularly since its initial publication, has effectively set the industry standard for digital cinema system concepts, compression, packaging, transport, projection, and security, and has ultimately defined and standardized the system requirements for the creation of digital cinema packages.

Digital Cinema Packages

In essence, a DCP is a collection of files used to store and convey digital cinema. The DCI defines the digital cinema package (DCP) as, "the standardized form of content intended for

[65] Digital Cinema Initiatives. "About Digital Cinema Initiatives." *DCI*. Digital Cinema Initiatives, LLC. Web. 11 May 2012. <http://www.dcimovies.com/>.

[66] "Entertainment Technology Center Named Official Testing Center by Digital Cinema Initiatives." *DCI Press Releases*. Digital Cinema Initiatives, LLC, 1 Dec. 2002. Web. 11 May 2012. <http://www.dcimovies.com/press/12-01-02.pdf>.

delivery to theatrical exhibition facilities,"[67] and in order to approach a firmer understanding of this technology, this section of the paper will provide a brief description of the standards to which the DCI refers by examining the System Specification version 1.2's "Major System Concepts" section.

The creation of a DCP begins with the Digital Source Master (DSM), or the content created in post-production. The DSM serves as a raw data file that can be formatted for a number of different purposes, among which include the DCI lists, "a film duplication master, a home video master, and/or a master for archival purposes."[68]

Once the DSM has been created, a Digital Cinema Distribution Master (DCDM) must be made. A DCDM takes the image, audio, and subtitle content of the DSM and arranges the components in a standardized file structure. This is necessary in order for the DCDM to be given a quality control check to ensure all the files are synchronized.

In order for the DCDM to be distributed it must first be compressed and encrypted. The latter process is to prevent theft of the intellectual property contained within the DCDM, using a series of ciphers (computerized encryption schemes that manipulate data) to 'lock' the original file so no one can gain access to it without a 'key.' Without compression, at the lowest quality for mainstream projection (2K, according to the DCI) a typical two-hour movie would take up almost 1.4 terabytes, or just over 1,400 gigabytes, of memory.[69] A file this large takes up far more space than is practical, and therefore must be reduced substantially using specialized computer programs before it can be distributed.

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[67] "Digital Cinema System Specification Version 1.2." *www.dcimovies.com*. Digital Cinema Initiatives, LLC., 7 Mar. 2008. Web. 14 Mar. 2012. <http://www.dcimovies.com/specification/index.html>. p. 22.

[68] Ibid.

[69] Mckernan, p. 52-53.

According to the DCI, "once the DCDM has been compressed, encrypted, and packaged for distribution, it is considered to be the Digital Cinema Package or DCP. This term is used to distinguish the package from the raw collection of files known as the DCDM."[70] The files that comprise the DCP are stored on a hard drive that is roughly the size of a library book, which is shipped to movie theatres in hardened cases that are designed to protect the hard DCP from damage. Finally, "when the DCP arrives at the theater, it is eventually unpackaged, decrypted and decompressed to create the DCDM*, where DCDM* image is visually indistinguishable from the original DCDM image."[71]

Digital Projection

In order to transform the digital image data into the light that appears onscreen as the DCDM* image, the DCP must be digitally projected. In the introduction to their "Projection" section, the DCI states that, "a core goal [of digital projection] is to have the mastering room image seen by the public."[72] There are many distinct projection models currently in use that can achieve this goal, and consequently the DCI only sets forth a series of fundamental system requirements necessary to faithfully replicate the DCDM rather than establishing one prototypical projection interface. These requirements include resolution, color space, brightness, and contrast.[73]

Understanding how digital image data is translated into an image onscreen is useful in order to reach some conclusions about how (or whether) this affects the experience of watching

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[70] "Digital Cinema System Specification Version 1.2." p. 22.

[71] Ibid.

[72] Ibid. p. 79.

[73] Ibid. p. 81.

repertory cinema. While this paper will not attempt to provide an overview of the many digital projection technologies currently in use, it will briefly explain how one system—Texas Instrument's Digital Light Processing (DLP) technology—achieves this.

DLP technology dates back to the late 1980s when the Digital Micromirror Device (DMD), the optical semiconductor at the heart of DLP, was invented.[74] The DMD is comprised of a series of tiny mirrors that are arranged in a rectangular pattern corresponding to the pixels as they will be displayed in the onscreen image. The mirrors are mounted on hinges and are designed to individually rotate back and forth at a 12-degree angle to an "on" or "off" position. By modulating the speed at which these mirrors are turned from the "on" to the "off" position, the level of image brightness can be controlled, ultimately allowing a greyscale image to appear onscreen.[75]

Most DLP projectors are actually equipped with three distinct DLP chips, and color is added to the image by splitting the light emitted from the projector's lamp into the three primary color frequencies, each of which is directed to a separate DLP chip. The red, green, and blue color information is rejoined in the lens to form the final image, which is projected onscreen.[76]

Texas Instruments built the first DLP prototype projector in 1994 and introduced the first commercial version two years later. Though originally shot on film, George Lucas' *Star Wars Episode I: The Phantom Menace* made history in June 1999 by becoming the first theatrically released film to be projected digitally in Los Angeles and New York.[77]

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[74] Texas Instruments Incorporated. "DLP History." *DLP Technology*. Texas Instruments Incorporated. Web. 11 May 2012. <http://www.dlp.com/technology/dlp-history/default.aspx>.

[75] Texas Instruments Incorporated. "How DLP Technology Works." *How DLP Works*. Texas Instruments Incorporated. Web. 11 May 2012. <http://www.dlp.com/technology/how-dlp-works/>.

[76] Ibid.

[77] Texas Instruments Incorporated. "DLP History."

Exhibition and Distribution of Repertory DCPs

The rate at which DCP technology has begun to transform repertory cinemas in New York City has been unprecedented. Whether willingly or unwillingly, every repertory cinema in New York City is exploring digital projection technology, while the pace of conversion is being quickened by Hollywood studios eager to cut costs.

In November 2011, 20th Century-Fox distributed a letter to exhibitors, strongly suggesting the switch to digital projection:

> The date is fast approaching when Twentieth Century Fox and Fox Searchlight will adopt the digital format as the only format in which it will theatrically distribute its films. We currently expect that this date will be within the next year or two…In short, the time is now for digital conversion.[78]

However, soon after the letter was sent, in April 2012 Fox announced its plans to discontinue all 35mm distribution by the end of 2013.[79]

Several months earlier in a series of conversations on the social media website Twitter, several repertory cinema programmers spread the rumor that Warner Brothers had quietly discontinued its 35mm print distribution. This ignited widespread speculation as to what would happen in the future if, after a cinema had converted to a digital projection system, a film it wanted to rent were not available digitally.[80] The commonly expressed fear was that, with

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[78] Frazer, Bryant. "Studios Put 35mm Prints on the Endangered-Species List." *Studio Daily*. 23 Jan. 2012. Web. 1 May 2012. <http://www.studiodaily.com/2012/01/studios-put-35mm-prints-on-the-endangered-species-list/>

[79] DeRuvo, James. "And So It Begins: 20th Century Fox to End Film Distribution." *Doddle*. 30 April 2012. Web. 7 May 2012. <http://news.doddleme.com/news-room/and-so-it-begins-20th-century-fox-to-end-film-distribution/>

[80] Frazer, Bryant.

perhaps the largest repertory library of all the major studios (including the classics of MGM, RKO, and WB), Warner Brothers' decision to bow out of 35mm distribution would have a calamitous effect on repertory film programming. According to a recent interview with Castro Theatre programmer Brian Collette, the rumor is untrue, and was a result of the fact that the studio has simply become very difficult to persuade to ship 35mm elements.[81] Nevertheless, the speculation illustrates one in a considerable list of issues with which repertory cinemas will have to address in the near future.

Although Warner Brothers has not completely discontinued its 35mm print distribution, Paramount has.[82] Park Circus (representing the MGM, Sony, and Samuel Goldwyn Repertory libraries), Janus Films, and Rialto Pictures (started by Film Forum's Goldstein) still distribute on 35mm;[83] Universal is also well-known for maintaining and distributing their classics library, encouraging access to their classics as well as the Paramount titles (1929-1949) within their collection.[84] But how long can these distribution branches hold out in the wake of DCP?

In the move from 35mm to digital, repertory cinemas have been generally disregarded. The film industry has always been a forward-thinking business machine, from the introduction of sound to color to CinemaScope to 3-D, and digital is the most recent industry-wide change that is rendering other formats relatively insignificant and obsolete. When studios discontinue their

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[81] Spector, Lincoln. "The Challenges of Digital Projection, Part 2: Distribution." *Bayflicks.net Blog*. 29 Feb. 2012. Web. 7 May 2012. <http://bayflicks.net/2012/02/29/the-challenges-of-digital-projection-part-2-distribution/>

[82] Alimurung, Gendy. "Movie Studios Are Forcing Hollywood to Abandon 35mm Film. But the Consequences of Going Digital Are Vast, and Troubling." *LA Weekly*. LA Weekly, 12 Apr. 2012. Web. 12 Apr. 2012. <http://www.laweekly.com/2012-04-12/film-tv/35-mm-film-digital-Hollywood/>.

[83] Spector, Lincoln.

[84] Westphal, Kyle. "Programming: How to Do Things with Films." *Northwest Chicago Film Society*. 20 Feb. 2012. Web. 02 May 2012. <http://www.northwestchicagofilmsociety.org/2012/02/20/programming-how-to-do-things-with-films/>.

35mm print production and distribution arms, it is in the interest of distributing and exhibiting *new* films on the digital format—how older, "classic" films will be seen is not a concern. The impact this change will have on repertory cinemas, which continue to rely on 35mm for their programming, doesn't seem to be a factor in the widespread format conversion. They are gearing up to be "the real loser in cinema's latest evolution."[85] If DCP represents progress towards the future, 35mm is the antique past, and the same seems to apply to the cinema of their respective eras when making the decision to discontinue distribution of one format in favor of the other.

Digitally scanning original film elements at "an extremely high resolution" (4K is the new standard as outlined by the Digital Cinema Initiatives group, equivalent to a horizontal resolution of 4000 pixels) and then working on color correction, dirt and debris removal, and frame-by-frame cleaning, the production of a classic film DCP is a process that can take up to a year to properly complete.[86]

However according to many, including Bruce Goldstein, this process can often result in a final product that would be impossible to achieve using traditional techniques,[87] and can produce a film that represents the closest representation of how the film originally looked upon its release (or better), but in some cases the closest to how the film looked as it was being shot.[88]

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[85] Puchko, Kristy. "Say Goodbye to 35mm, Theaters Will Be Digital-Only by 2015: A Eulogy." *The Film Stage*. 16 Nov. 2011. Web. 10 May 2012. <http://thefilmstage.com/features/say-goodbye-to-35mm-theaters-will-be-digital-only-by-2015-a-eulogy/>

[86] Popkey, Miranda. "With a Clutch of Screenings, Film Forum..." *Capital New York*. 5 Mar. 2012. Web. 7 May 2012. <http://www.capitalnewyork.com/article/culture/2012/03/5405944/clutch-screenings-film-forum-makes-case-switch-film-digital-projecti>

[87] Goldstein, Bruce.

[88] Ibid.

Repertory DCP Projection

There are three principal issues surrounding repertory DCP projection: cost, projection, and availability. All have pros and cons well worth addressing in the continuing debate over formats. First and foremost is cost. While there is no established industry pricing standard for DCP creation or film-out production, prices are generally between the $1,500 and $4000 mark for a print (a figure that continues to rise as film materials are phased out of production by Fuji, Kodak, and other manufacturers) and as low as $150 for a feature-length DCP.[89] Also factoring in rental fees, booking a DCP is strikingly cost-effective in comparison to booking the same title on 35mm.

Another important benefit to DCPs is that whereas a print begins to wear out after its very first projection, a DCP will never wear out. Additionally, while a print is at least a generation lower in quality than an original element such a negative or an inter-positive, each DCP of a given title is audio-visually identical to the original digital file. There is no loss of quality in the duplication process.

In addition, some venues can even request a DCP be made of a given film they wish to screen, provided they have the patience and money to have it done (around $40,000 for a 2K and even more for a 4K, rather steep for a repertory title).[90][91] In terms of shipping, prices are boldly different. Film Forum has paid thousands of dollars for prints shipped domestically as well as

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[89] Alimurung, Gendy.

[90] Asch, Mark. "Technostalgia". *The L Magazine*. 18 Jan. 2012. Web. 10 May 2012. <http://www.thelmagazine.com/newyork/technostalgia/Content?oid=2203849>

[91] Bordwell, David. "Once More, Mad City Movies". *Observations on Film Art Blog*. David Bordwell and Kristin Thompson, 15 April 2012. Web. 7 May 2012. <http://www.davidbordwell.net/blog/2012/04/15/once-more-mad-city-movies/>

internationally, including print booking fees, and considering their print-heavy yearly schedule, the bills add up.[92] DCP's, typically the size of a hardback book, clearly cost a great deal less to be shipped.

However, while the cost of creating and shipping DCPs may be considerably cheaper, the physical machinery required to project them is not. Digital cinema projectors can cost thousands of dollars (between $50,000 and $100,000) to purchase and install, with no guarantee they will last.[93] One theater in Los Angeles has already gone through two projectors that have simply burnt out.[94] With digital cinema comes the introduction of VPFs (Virtual Print Fees), a system where a cinema pays the supplier of digital content (i.e., a studio) for the right to digitally project a film.[95] These are similar to the age-old repertory issue of print booking fees, but can also be used to offset the cost of equipment installation through a third party, who is paid by the supplier and is reimbursed through payment of VPFs.[96]

Attached to the installation of new equipment is the reduced need for actual projectors. Consequently, the days of manual projection of a film's medium are on the wane. However, the proposed simplicity of digital projection has already resulted in improper handling of the new technology.[97] Projectionists unaware of things as simple as the differences in lenses of digital

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[92] Goldstein, Bruce.

[93] Bordwell, David. "Pandora's Digital Box: Art House, Smart House." *Observations on Film Art*. David Bordwell and Kristin Thompson, 30 Jan. 2012. Web. 25 Apr. 2012.
<http://www.davidbordwell.net/blog/2012/01/30/pandoras-digital-box-art-house-smart-house/>.

[94] Alimurung, Gendy.

[95] MPKE Consulting, LLC. 2012. Web. 7 May 2012. <http://mkpe.com/digital_cinema/faqs/>

[96] Bordwell, David. "Pandora's Digital Box."

[97] Westphal, Kyle. "The Projection Booth, the Radical Seat." *Northwest Chicago Film Society*. 21 Dec. 2011. Web. 02 May 2012. <http://www.northwestchicagofilmsociety.org/2011/12/21/the-projection-booth-the-radical-seat/>.

projectors are one of the key problems in DCP exhibition today.[98] Part of this problem might be the lack of widespread standardized knowledge of the newly installed projectors or file formats, or it could be the assumption that digital is easier, when in fact it comes with a new set of rules and behaviors that not everyone has been or is interested in learning. While DCPs are supposed to correct projection issues that have affected the colors and brightness of films when projected theatrically, there is still the risk of human error keeping DCP and its full potential from being seen and appreciated by audiences.

While Hollywood at large may seem to feel that digital projection may remove the need for projectionists, thus making DCP even more affordable in the long run, the expected errors inherent in the implantation of a new technology have already begun plaguing digital projection, requiring human intervention to solve the problem. Stories of films being deleted from DCP hard drives before screenings are not just restricted to new releases like *The Avengers* (2012).[99] At the Turner Classic Movie Festival in Los Angeles, a screening of *Love Story* (1970) was halted at a crucial moment in the narrative when the DCP "decided not to cooperate", resulting in a back-up copy being produced 15 minutes later.[100] Taking into account the considerable amount of time it takes to upload a DCP to the projector's hard drive, if an error or malfunction occurs, the likeliest solution will be to resort to a Blu-Ray or DVD of the film to complete the screening. Blogger Will McKinley, who reported the *Love Story* event, claimed that he had experienced

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[98] Ebert, Roger. "The Dying of the Light." *Chicago Sun-Times Blog*. 24 May 2011. Web. 10 May 2012.
<http://blogs.suntimes.com/ebert/2011/05/the_dying_of_the_light.html>
[99] Anderson, L. V. "How The Avengers Got "Deleted"." *Brow Beat: Slate's Culture Blog*. Slate Magazine, 26 Apr. 2012. Web. 27 Apr. 2012.
<http://www.slate.com/blogs/browbeat/2012/04/26/the_avengers_deleted_at_a_press_screening_how_the_digital_age_makes_it_easier_to_lose_movies.html>.

[100] McKinley, Will. "TCM Film Fest Day 2". *The Cinementals*. 14 April 2012. Web. 7 May 2012.
<http://thecinementals.org/2012/04/tcm-film-fest-day-2/>

"playback flaws" with additional classic film DCPs, but declined to elaborate on that statement.[101]

Given the ever increasing presence of DCP in repertory programming, what classic films are currently available on DCP? Insistent that in the coming years the numbers will grow, Goldstein has said that right now "only a handful of classics are available on DCP."[102] While a master list of classics available on DCP does not exist, by comparing the repertory schedules of Film Forum in New York, the American Cinematheque in Los Angeles, as well as investigating the work output of DCP producer Hollywood Classics, it appears there are far more than a "handful" of films on DCP. At the time of writing, there are currently 143 classic DCPs. These films span the years 1922 to 1980, but are generally classics of popular demand and well-recognized titles to the general public, films that warrant the cost of digital restoration and scanning for repertory bookings. Recent anniversary re-releases of *West Side Story* (1961) and *Casablanca* (1942) were both distributed on DCP, which gives an idea what level of classic film is receiving the digital scan treatment. Universal, celebrating its 100th anniversary this year, has prepared DCP's of some of its biggest classic titles, including *All Quiet on the Western Front* (1930), *To Kill a Mockingbird* (1962), and *Jaws* (1975). Most of Hitchcock and Kubrick's most popular films are available on DCP. The DCP releases of *On the Waterfront* (1954) and *Lawrence of Arabia* (1962) are on the horizon.[103]

While the restorations that have gone into producing these classic DCPs often provide films with a new lease on life, by the same token it means that, for all intents and purposes, the

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[101] McKinley, Will.

[102] Goldstein, Bruce.
[103] Popkey, Miranda.

film no longer exists on 35mm. Any repertory cinema wishing to book *Singin' in the Rain* (1952), *Breakfast at Tiffany's* (1961), or *The Godfather* (1972), among others, will only have the option of screening it on DCP. The studio will not ship a 35mm print if the preferable format, DCP, is available. And even if there isn't a DCP, as in the case of many Warner Brothers and Fox films, those studios, and soon others like it, still won't supply prints to rep cinemas. As prints become scarcer to find outside of print collecting circles and archives, the transition to DCP seems inevitable for any theater wishing to draw in crowds with popular classic titles. John Fithian, president of the National Association of Theatre Owners, has put it best: "If you don't make the decision to get on the digital train soon, you will be making the decision to get out of the business."[104]

One of the repertory theaters most prepared for digital adaptation was the Walter Reade Theater, where programmer Pena has consistently believed, "Between the purity of the medium and access for the public, I fall on the side of access for the public."[105] Therefore, if a film is only accessible on DCP, that becomes the exhibition format for Walter Reade and its audience. Most repertory venues in the city, as discussed above, do not strictly program classic films, and those theaters screening contemporary films, including BAM Cinematek, MoMI, and Film Forum, are already equipped with digital projectors. Others, like Anthology Film Archives and 92Y Tribeca, may never be able to afford the upgrade. [106] Anthology has a large print collection as well as connections with print archives to help serve its repertory calendar needs; 92Y does not. It will be interesting to see where both theaters stand on the DCP issue over the next few years.

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[104] Alimurung, Gendy.

[105] Sluis, Sarah. p. 25.

[106] Asch, Mark.

"This is DCP"

In 2009, Goldstein noted that if anything digital projection would greatly help with subtitles, "if it ever comes to digital for classics."[107] A mere three years later, Film Forum programmed the week-long series "This is DCP!" to officially roll out digital projection in the city's most recognized repertory setting. While they had quietly introduced DCP a month earlier with their digital projection of *Wings* (1927), this series not only included thirteen classics in brand-new digital presentations, but a side-by-side comparison of a 35mm print and a DCP of *Dr. Strangelove* (1964).[108] The calendar description of the DCP festival asserted that "the jury was still out" in the debate of film versus DCP, but as the new industry standard, the jury has deliberated and reached a verdict: film is found guilty of being antiquated.[109]

"This is DCP" sold out the majority of its screenings and earned tremendous publicity (as the press release stated, "DCP just can't be ignored"). Some felt it was "an odd mix of reassurance, self-promotion, and apology."[110] Others were skeptical of all classic film DCP's living up to the high standard set by the series: "A meticulous DCP can provide a better and more consistent viewing experience than 35mm but such transfers are the exception to the norm."[111] Film scholar and critic Doug Dibbern wrote of the 35mm print of *Dr. Strangelove* as seeming more "alive" in comparison to the DCP, the vibrations of the print as it ran through the

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[107] Sluis, Sarah. p. 25.
[108] Rapfogel, Jared. "Repertory Film Progamming."

[109] Film Forum. 2012 Repertory Calendar. Print.

[110] Popkey, Miranda.

[111] Jonah. "Preview: Film Forum's THIS IS DCP retrospective." *I Want Some Perfection Blog*. 2 Mar 2012. Web.

projector bringing the film to life in a way that digital could not.[112] Regardless of the varied

reactions to "This is DCP", Film Forum has already embraced additional digital programming

since the series, even including relatively obscure titles like *Bonjour Tristesse* (1958) and *Puzzle*

of a Downfall Child (1970).

During an interview with the authors, Goldstein said that some films, like 1945's

Children of Paradise and 1957's *Funny Face*, will benefit from being made available as DCPs,

both virtually impossible to find in projectable print form.[113] In his "This is DCP" discussion of

the 4K digitization of *Dr. Strangelove*, Vice President of Sony Pictures Asset Management, Film

Restoration, and Digital Remastering Grover Crisp provided back story about the film's missing

negative. The same is true for *Bye Bye Birdie* (1963), another film currently only available on

DCP.[114] However, for every one film made available on a DCP, there are dozens and perhaps

hundreds of other titles that will be unavailable for repertory screenings as 35mm distribution

continues to dwindle industry-wide.

Many repertory programmers in the city, and nationwide, are optimistic about the future

of repertory programming, despite the death knoll rung by journalists and scholars mourning the

loss of 35mm. Haden Guest of the Harvard Film Archive believes "the art of culture and cinema

will continue to grow and thrive as we go further and fully into the digital era", and despite "This

is DCP", Film Forum's Goldstein has "an emotional attachment to 35mm" and "will continue to

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[112] Dibbern, Doug. "Veneration and Its Discontents." *MUBI.* 26 Mar. 2012. Web. 26 Mar. 2012.
<http://mubi.com/notebook/posts/veneration-and-its-discontents>

[113] Goldstein, Bruce.

[114] Popkey, Miranda.

be extremely discriminating when it comes to digital."[115] Even those who "believe experiencing film is a deeper, richer, and more dreamlike experience than absorbing the electronic image", as former MoMA senior curator Laurence Kardish does, acknowledge that "the digital role will play a primary role in our popular culture." [116]

The question of users is, one would feel, an important one when considering the transition from 35mm to digital. However, as Pena, Goldstein, and Schwartz, among other programmers, will attest, the vast majority of today's repertory audiences are not the hardcore cinéphiles that were one the residents of yesterday's New York rep cinemas. Schwartz made it clear that no user studies were being performed in their transition to digital, and expressed surprise at feelings of outrage surrounding DCP's of classic films in place of traditional 35mm projection. Unlike the Walter Reade Theatre, Film Forum, MoMA, and BAM, MoMI makes no indication of the format on which it screens a given film, making it unlikely users are even aware they are potentially watching a DCP instead of a print. When asked about performing user studies, Pena claims that "whether we do or not, they sure let us know!"[117] At a recent Film Forum "Meet the Programmers" event, Goldstein and Karen Cooper explained what DCP was to the audience; more than half of the audience had never heard of the new format, and didn't appear to care one way or the other how their favorite classics were being projected.[118]

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[115] Rapfogel, Jared. "Repertory Cinema Programming".

[116] Ibid.

[117] Pena, Richard. E-mail interview. 25 April 2012.

[118] Goldstein, Bruce and Karen Cooper. "Meet the Programmers" event. 28 April 2012.

Much of the vocal outcry over the transition from 35mm to digital seems to be from hardcore cinéphiles, archivists, and others in the business of celluloid. While it's important to consider the users of repertory cinema, it's also vital to consider the theory behind the 35mm format defining cinema itself and how digital cinema possibly conflicts with theories surrounding the experience of film, particularly on celluloid, in a theatrical setting.

"Cinema is dead; long live cinema"[119]

Beyond the marginal cost to exhibitors and the pros and cons of DCP technology, what does the increasing popularity of DCP mean in the broader realm of film theory? Additionally, what implications does this have for 35mm film within the history of the moving image at large? In "Digital Cinema and the Apparatus: Archaeologies, Epistemologies, Ontologies," film scholar Thomas Elsaesser approaches these questions by asking, "Does the digital image constitute a radical break in the practice of imaging, or is it merely a logical-technological continuation of a long and complex history of mechanical vision, which traditional film theory has never fully tried to encompass?"[120]

Elsaesser raises this question in part due to the Manichean divide that he has observed between those who argue in favor of and against digital cinema. Seeking to draw conclusions about the position that digital cinema occupies within film history, Elsaesser begins by defining

[119] This quote is from a speech given by Peter Greenaway at the European Graduate School in Saas Fee, Switzerland, in August 2003, as quoted in: Willis, Holly. *New Digital Cinema: Reinventing the Moving Image*. London: Wallflower, 2005. Print. p. 1.
[120] Elsaesser, Thomas. "Afterword - Digital Cinema and the Apparatus: Archaeologies, Epistemologies, Ontologies." *Cinema and Technology: Cultures, Theories, Practices*. By Bruce Bennett, Marc Furstenau, and Adrian Mackenzie. Basingstoke, England: Palgrave Macmillan, 2008. 226-40. Print. p. 226.

the two most frequent attitudes toward digital cinema he has observed among his peers. Elsaesser

conjures this divide by describing the two points of view as being fundamentally at odds,

existing as distinct camps on either side of a line drawn in the "silicon sand."[121] On one side of

the gulf are the traditionalists, who regard 35mm film as a holy object that cannot—or perhaps

should not—be superseded by digital technology:

> To some of my generation, the electronic media (TV and digital media) do not belong to the history of the cinema at all. On this side of the divide are above all those for whom the photographic image is sacred, and for whom celluloid is the baseline of a 150-year visual heritage that must not be plundered, devalued, faked, or forged.[122]

This position is often adopted by die-hard cinéphiles who, according to Elsaesser,

"[think] the loss of the indexical link with the real in the digital image presents a major threat to

mankind's pictorial patrimony, as well as to the cinéphile universe."[123] This point of view

privileges a set of assumptions about realism in cinema that are directly tied to the indexicality of

the photographic image as a defining characteristic of the medium. This perspective is embodied

in an essay written by film theorist Lev Manovich, who describes the cinema as a record:

> No matter how complex its stylistic innovations, the cinema has found its base in these deposits of reality, these samples obtained by a methodical and prosaic process. Cinema emerged out of the same impulse that engendered naturalism, court stenography, and wax museums. Cinema is the art of the index; it is an attempt to make art out of the index.[124]

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[121] Ibid.

[122] Ibid. p. 227

[123] Ibid.

[124] Manovich, Lev. "What Is Digital Cinema?" *The Digital Dialectic: New Essays on New Media*. Ed. Peter Lunenfeld. Cambridge, MA: MIT, 1999. 172-92. Print.

As film theorist Stephen Prince notes, arguments centering on the indexicality of the photographic image in turn "constitute part of the bifurcation between realism and formalism in film theory" which itself represents a gulf that cannot be bridged.[125] For Prince, any argument that centers on an indexically based notion of cinema ignores the fact that it will inherently exist, "in tension with a semiotic view of the cinema as discourse and of realism as one discourse among others."[126] Prince's essay draws out an understanding of digital cinema as being based upon a fundamentally distinct ontology than that upon which traditional film is based.

On the other side of the divide, Elsaesser identifies a group of film scholars that understand digital cinema should be premised on the idea that the advent of digital technology is merely "business as usual," and sets forth the argument these scholars might make in favor of digital cinema:

> The film industry, for nearly a hundred years, has been delivering the same basic product, the full-length feature film, as the core of the cinematic spectacle and the institution cinema [sic]. Technological innovations there have been all along, but they have always been absorbed and accommodated, possibly reconfiguring the economics of production, but they left intact the context of reception and the manner of programming. Digitization does not appear to have changed this state of affairs.[127]

The greatest advocate of this perspective is film scholar Leo Enticknap, who argues that the underlying cultural and economic factors that drive technological development have remained constant since the standardization of 35mm film around the turn of the twentieth century. In his technological history of the cinema, *Moving Image Technology: From Zoetrope*

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[125] Prince, Stephen. "True Lies: Perceptual Realism, Digital Images, and Film Theory." *Film Quarterly* Spring 49.3 (1996): 27-37. Print. p. 28

[126] Ibid. p. 31.

[127] Elsaesser, Thomas. p. 227-8.

to Digital, Enticknap takes pains to illustrate how many aspects of the cinema have remained relatively constant since its advent, and makes an argument for the persistence of the cinema as an institution well into the future. For Enticknap, the advent of DCP is merely one in a long line of technological innovations that have arisen to transform the experience of watching a projected image onscreen. Here it is worth quoting Enticknap at length:

> You can still be scared when King Kong stomps around munching the natives, shed a tear when Ingrid Bergman gets on the plane and giggle as Bruce Willis is introduced to The Gimp. None of that is going to change. But, apart from in a tiny handful of theatres worldwide, you can no longer watch King Kong's rampage on an alumised, tobacco-smoke resistant screen, lit by a carbon arc lamp and projected on a nitrate print through a really s****y (by 21st century standards) 1930s, f5 lens that is only able to focus a small patch of the dead centre of the image. Yet I'm not aware of the format purist brigade having fought campaigns against the introduction of safety film, the xenon lamp, computerised glass grinding in lens manufacture and the banning of smoking in theatres.[128]

It is important to note that for Enticknap, whether safety film and the xenon lamp, for instance, are improvements upon nitrate film and the carbon arc is beside the point. (In fact, in both these instances, Enticknap explicitly draws attention to the higher silver content of nitrate film and the distinctly preferable light temperature emitted by carbon arcs, providing evidence that each of these earlier technologies may have offered distinct advantages in some areas over the technologies that superseded them).

Rather, Enticknap's contention is that, as has been repeated many times over the past century, a combination of market forces and cultural factors will drive technological advents, which will in turn become standardized and adopted on a widespread scale. With regard to the advent of DCP, Enticknap concludes that, "Nostalgia is not a valid reason for keeping an

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[128] Enticknap, Leo. "Reply: Fight for 35mm, Petition Targeting Major Film Studios." Listserv Posting. *Association of Moving Image Archivists Listserv*. Association of Moving Image Archivists, 19 Nov. 2011. Web. 6 Apr. 2012. <http://lsv.uky.edu/archives/amia-l.html>.

obsolete technology on life support in the mainstream. … We can no more stop the wholesale transition to DCP projection in 2011 than we could have prevented silent films going away in 1931."[129]

"Veneration and Its Discontents"

The divide that Elsaesser discusses is clearly manifest in the sharply polarized perspectives above. But where does this divide originate, and why is it so sharply divided? A significant clue lies in the language that is often used in discussions surrounding the death of film in the digital age. In a recently published article written in response to Film Forum's "This Is DCP" series, film scholar and critic Doug Dibbern addresses this question by turning a critical lens on the cinéphiles who maintain a reverence for celluloid in spite of the arrival of digital technology. Dibbern says,

> Most of the cinéphiles I know are fairly agnostic, but we tend to treat movies as sacred objects. That's why the geriatric nutjobbers who crinkle lozenge wrappers during MoMA screenings are so annoying—not just because they make it difficult to hear the dialogue, but because they don't treat the film with the proper degree of reverence. I mean, even the atheists among us wouldn't guzzle Coors from a beer hat at a baptism no matter what they thought about religion. The need to revere the sacred seems to be an innate human trait, regardless of one's degree of faith.[130]

The language Dibbern uses in the service of describing the celluloid hold-outs—"sacred," "reverence," "baptism," "religion," and "faith"—conjures theology. Elsaesser echoes this point, defining cinéphiles by their understanding of film as a "sacred" medium "that must not be

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[129] Ibid.
[130] Dibbern, Doug.

plundered, devalued, faked, or forged." If film is understood as or defined by cinéphiles as a sacred object, what inspires this reverence, and what implications does it have for film in the age of digital cinema?

35mm Film in the Age of Mechanical Reproduction

In "The Work of Art in the Age of Mechanical Reproduction," Walter Benjamin examines the tradition of the work of art as an object of veneration, noting that, "the earliest art works originated in the service of a ritual—first the magical, then the religious kind."[131] For Benjamin, "the unique value of the 'authentic' work of art has its basis in ritual, the location of its original use value," imbuing the artwork with authenticity. This authenticity, in turn, produces what Benjamin terms "aura."[132] Benjamin's essay centers on how aura is lost when a work of art is mechanically reproduced, arguing that, "the technique of reproduction detaches the reproduced object from the domain of tradition. By making many reproductions it substitutes a plurality of copies for a unique existence."[133]

"The Work of Art in the Age of Mechanical Reproduction" provides an instructive point of departure from which to investigate the questions raised by Dibbern's article because it helps explain the religious attachment to the medium Dibbern articulates. But it is complicated by the

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[131] Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction." *Illuminations*. Trans. Hannah Arendt. New York: Schocken, 1986. 217-51. Print. p. 223.
[132] Ibid. p. 221.

[133] Ibid.

fact that for Benjamin, film was inherently devoid of aura due to the fact that it was not unique, but rather one of a "plurality of copies."

Benjamin's essay was published in 1936, coinciding almost exactly with the beginning of what film scholar Penelope Houston calls the "archive movement," or the foundation of film archives across the world seeking to preserve and restore moving images.[134] In the years that have followed, film preservationists have vocally rejected the notion that every copy of a film is identical. "Generational loss" is a term that has been coined by technicians to describe the loss of quality (the introduction of fading and a loss of resolution) that occurs during photochemical duplication process between subsequent copies of films. Film scholar Holly Willis describes generational loss: "Each time…photochemical film…is copied, some of the original information fidelity or precision is lost in the process of transcription, causing image quality to suffer and limiting the number of copies that can be made."[135] While Benjamin is correct that film is a reproducible medium, he is incorrect to assume that the "plurality of copies" existing of a work means these copies are identical to one another—on the contrary, any film technician would argue that each is a unique object.

Digital, however, is fundamentally different from film in this regard. Willis explains, "A digital camera does not record an analog signal of continuously varying voltages but instead a series of zeroes and ones in a pattern of relationships defined by mathematical algorithms. … As a result, digital information may be endlessly duplicated."[136] Thus, with no discernible difference

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[134] Houston, Penelope. *Keepers of the Frame: The Film Archives*. British Film Institute: London, 1994. p. 4.

[135] Willis, Holly. p. 6.

[136] Ibid.

between an original file and its subsequent copies, digital becomes a reproducible medium *par excellence*.

Benjamin claims that, "the uniqueness of a work of art is inseparable from its being imbedded in the fabric of tradition."[137] Despite Benjamin's insistence about the reproducible nature of film, might his argument about the loss of aura be better applied to digital cinema, which represents the ultimate reproducible moving image? If so, by implication this would re-imbed film within the fabric of tradition, imbuing it with the aura that Benjamin insisted film lacked. But if this were the case, it would imply that not only is celluloid's aura dependent upon its roots in tradition, but its vulnerability.

Conclusion

During the heyday of repertory cinema programming in New York City, there was no choice other than to project a film on celluloid. It was only after the decline of the repertory cinema scene began its decline and the advent of digital projection arose in the 1990s that the broader implications of a film's native format began to be discussed in earnest.

While the advent of DCP technology has not altered the fundamental goal of repertory cinemas, it appears that biggest logistic challenge facing repertory programmers in the new digital age will be navigating the content that is available (or the lack thereof) in a digital format. But programming aside, the conversion from film to digital within repertory cinemas raises a number of broader, cultural implications about the function of film-going in the digital age, and the impact this will have on the status of 35mm film as an artefact.

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[137] Benjamin, Walter. p. 223.

Thomas Elsaesser addresses this in his essay about digital cinema, discussing the divide among the "traditionalists" who believe who regard 35mm film as a holy or "sacred" object, and for whom digital cinema represents a betrayal, and the "business as usual" approach to digital cinema, which argues that digital cinema is a natural and inevitable development that does not alter in any way the institution of the cinema.

For those in the latter category, the advent of digital projection has been heralded as the future of the moving image because it allows for the accumulation of scratches, dust, missing frames, and warps in the soundtrack to be eliminated entirely. For cinéphiles like Dibbern, it is precisely these imperfections that make the event of watching a film so pleasurable; to convert any film to a series of ones and zeroes that may be endlessly reproduced strips the film of its individuality.

This individuality is what Walter Benjamin originally understood as aura—"all that is transmissible from its beginning, ranging from its substantive duration to its testimony to the history which it has experienced."[138] In an age when technology has enabled works of art to be copied without any generational loss in order to create a perfectly identical copy, concepts like authenticity and originality are diminished. This, in turn, bolsters the analog format as a fragile and finite object. In the digital age the roots of celluloid in the domain of tradition are emphasized in a way that was not possible previously, serving to imbue the 35mm film with aura.

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[138] Benjamin, Walter. p. 221.

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