
HOLLYWOOD'S HIGH FRONTIER: THE EMERGENCE OF ELECTRONIC CINEMA

Author(s): MICHAEL NIELSEN

Source: *Journal of Film and Video*, Vol. 36, No. 2, SPECTATORSHIP AND NEW TECHNOLOGY (Spring 1984), pp. 31-42, 72

Published by: [University of Illinois Press](#) on behalf of the [University Film & Video Association](#)

Stable URL: <http://www.jstor.org/stable/20687603>

Accessed: 06-01-2016 15:49 UTC

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



University of Illinois Press and University Film & Video Association are collaborating with JSTOR to digitize, preserve and extend access to *Journal of Film and Video*.

<http://www.jstor.org>

HOLLYWOOD'S HIGH FRONTIER: THE EMERGENCE OF ELECTRONIC CINEMA

MICHAEL NIELSEN

Introduction

This paper traces the very gradual emergence of electronic cinema. The central theme of this small bit of technological history is that electronic cinema has thus far been a movement against the grain of entrenched institutional arrangements in the motion picture industry. The theme is developed primarily from an economic perspective, but with some consideration of aesthetics as well, because a full-blown electronic system challenges not only long-established production, distribution, and exhibition patterns, but also the very chemical basis of motion pictures themselves, a move away from Matthew Brady and towards MTV, to put the case in absurd terms.

A transition from film to tape technology in the motion picture business might involve changes in any one or all segments of the chain of production, distribution, and exhibition. Thus, it is difficult to precisely define the bounds of "electronic cinema." It is generally understood in the motion picture industry today to refer to production of theatrical motion pictures on videotape rather than on 35mm film, but electronic cinema can also refer to the

MICHAEL NIELSEN is a PhD candidate at the Institute of Communications Research, University of Illinois. He is currently researching and writing a "craft workers' history of Hollywood", a merging of oral history and institutional analysis of motion picture craft work and craft unions.

Copyright © 1984 by Michael Nielsen

distribution and/or theatrical exhibition of video motion pictures. It is conceivable that videotape motion pictures could be distributed to theaters by converting them to 35mm film; the technology for high quality tape to film conversions now exists. Also, it is equally possible that motion pictures made on 35 mm film could be distributed by electronic means (tape, disc, cable, etc.) and projected video projectors. A plausible future for electronic cinema is outlined in the final section of this paper, but the reader should always bear in mind that "electronic cinema" may take many forms. And various segments of the industry (producers, film labs, theater owners, labor unions, etc.) as well may all have different images of just what electronic cinema means.

There is little attempt in this paper to do justice to the psychological differences between the perception of film versus video images. This issue is complex and becomes even more so when video images are projected on reflective screens rather than on phosphorescent screens as in regular video viewing. This paper does not offer qualitative comparisons between 35mm film and videotape. But the evidence gathered here suggests that film is under serious challenge from tape. Marshall McLuhan may have hit upon a valid distinction between "hot" motion pictures and "cool" television, but he based his propositions on the image resolution of film versus video, a distinction currently under challenge from a variety of new television systems.

The idea of electronic cinema has been around in various forms for over thirty years, but the recent development of HDTV (High-definition Television) by the Japanese Broadcasting Company (NHK) may be the so-called "final link" towards electronic cinema.¹ In adopting a critical/historical perspective on the topic, feasibility and blue-sky futures will be considered in terms of policy issues and market conditions, two formerly distinct but increasingly synonymous terms. Attention will be focused on how motion picture, broadcasting, and electronics companies have tried to "sell each other" via trade journals and in the popular press on the idea of electronic movies and other film/video interfaces.

This paper will deal with issues of production and distribution cost reductions made possible by remote interconnects and, to a certain extent, by deskilling—that is, by redefining traditional motion picture jobs in the new terms of video production. Yet another provocative topic only hinted at in this paper is that electronic cinema offers its cost reductions only to those able to pay the price of the new equipment. The high equipment costs of electronic cinema or HDTV may contribute to increased concentration in the motion picture and broadcasting industries, particularly in the *laissez-faire* business climate of the 1980s. Electronic cinema is, to steal a bit of space colony jargon, the "high frontier" of motion picture production.

The Technology

A useful starting point in considering the history of electronic cinema is a review of the fundamentals of television image resolution and bandwidth requirements. The television image is created by a stream of electrons striking a phosphorescent screen. Each phosphor dot on the screen is called a pixel (short for "picture

element"), and these dots are arranged in lines and rows to produce the matrix that makes up one frame of a television image. The electron gun is controlled by a synchronizing signal that shifts the stream of electrons back and forth across the screen several thousand times per second.

The U.S. system utilizes a 525-line signal, 80% of which is dedicated to actual image information with the remaining portion set aside for synchronizing signals. Each of the image lines contains some 400 pixels of resolution, resulting in an optimum number of about 170,000 pixels per frame; however, this optimum is seldom reached because of mass production set design and signal degradation in transmission. Realistically, a good set with a good antenna or cable hook-up can get about 100,000 pixels per frame. By way of comparison, the average release print of a 35mm motion picture film has nearly ten times the resolution of this average U.S. television picture. Thus, to equal the resolution of motion picture film, a television signal would have to contain some one million pixels. All the television equipment involved in production, transmission, and reception would also need to be proportionally better to handle such a signal, and perhaps most importantly, this improved television signal would have a much higher bandwidth than conventional television signals. It might use from five to eight times the amount of spectrum space as a conventional television signal.

This spectrum consideration, however, does not apply to closed circuit applications such as the production of videotape programs. These "high-resolution" videotapes could then be distributed in a variety of non-broadcast formats such as tape-to-film transfer, new video playback systems, cable, or satellite transmissions. These are, in fact, precisely the sort of ideas that are currently bouncing around

the engineering and corporate offices of the motion picture and broadcasting companies. Motion picture producers are rather hesitantly approaching this new field of electronic cinema. But there are numerous references to a transition from film to tape in the trade journals if one is predisposed to looking for such references.²

Those Paths Not Taken

Much of the research for this paper was stimulated by my discovery of *Electronic Motion Pictures*, a 1955 monograph by electrical engineer Albert Abramson. The book describes a number of prototype film/video systems that for the most part failed to gain acceptance in either the film or broadcasting industries. Consider, for example, a “film-intermediate” system developed by Fernseh A. G. of Germany in 1932.

Any object or scene which had to be televised was first filmed under artificial light or in daylight, then the film was rapidly developed, fixed, and scanned in some fifteen seconds. A scanning disc dissected the picture into 99 lines at a frame rate of 24 pictures per second.³

Fernseh also developed a receiving system for television signals utilizing essentially the inverse of the above process with the final image projected onto a theater screen.

Electronic Motion Pictures is full of such engineering oddities as well as details of the research activities of various motion picture and broadcasting firms. (Notably absent from the book is a good sense of the corporate strategy behind the research activity—the desire to control patents and licenses.) Abramson pays particular attention to the problems of recording “live” television productions. Prior to the

development of practical magnetic videotape recording, the television networks were dependent on film copies of live programs (kinescopes) for time-delayed transmissions to western time zones as well as for repeat showings of programs and “live” actualities such as the World Series. Even with high quality 35mm recording equipment, the kinescopes were limited in image resolution by the 525 lines of the television screen being filmed. This image quality problem was even more acute in the case of the 405-line British system. Thus, it is not surprising that British researchers approached the problem directly. High-definition Films, Ltd. was established in 1952 to develop a closed-circuit video system intended for the production of high quality 35mm film recordings of television images. Although the company originally intended to develop a 992-line system, they eventually settled for 834 lines at 24 frames per second. The special high-definition television screens were filmed by a 35mm camera. The system may have failed for technical reasons or it may have been eclipsed by the arrival of videotape. Abramson is not clear on this point and I was unable to discover any more information on this detail, but the High-definition Films system was actually used in a BBC production.

One half hour dramatic film made for the BBC was televised in the summer (of 1954) and was widely acclaimed by critics and viewers alike. One critic called it “. . . a presentation almost as important to TV as the widescreen to cinema.”⁴

With hindsight, we can see that the High-definition Films system could never equal the clarity, economy, and ease of handling of videotape. But it should be remembered that even the very resourceful RCA, with the aid of partial Defense Department funding, was still struggling to develop a

practical videotape recorder. In late 1953, the best they could come up with was a machine with a tape speed of thirty feet per second. Reels seventeen inches in diameter could hold four minutes of programming!⁵ Abramson closes his study of electronic cinema with an uncannily accurate foretelling of the eventual development of HDTV in the 1970s and 1980s.

In England it is in the development of suitable closed circuit cameras not confined to broadcast standards. In the United States it is in the development of equipment for the magnetic recording and playback of the video signal. There is no reason why these two processes will not eventually be combined for the purposes of making electronic motion pictures of the highest technical quality.⁶

Another component of electronic cinema is video projection. In addition to the previously mentioned intermediate-film process of Fernseh A. G., an alternative television projection system was developed by a Swiss research institute in 1941. It was originally called the Teleidoscope and utilized an arc lamp light source, a constantly renewed oil film surface, and an electron gun that excited the oil surface, creating a projectable image. In 1948, Paramount Pictures, Inc., installed a number of intermediate-film television receiving systems in its theaters, presumably to allow nearly instantaneous presentations of sports or cultural events. This move was aimed at countering accelerating competition from television in the major markets. Paramount, Twentieth Century-Fox, and numerous other motion picture firms petitioned the FCC in 1949 for specific frequencies to be set aside for theater television service.⁷ During this period, Fox invested heavily in the further development of the Teleidoscope for color television projection. The product of this

effort was named the Eidophor and drew a certain amount of national press coverage. The Eidophor, in the opinion of the *Newsweek* reporter, produced "... flat pastels (that) did not compare with Technicolor's full-bodied hues."⁸ Fox must have scratched an important back at *Life* magazine because three months after the *Newsweek* article, *Life* published a piece that sounded much like a rhetorical reply from the Fox public relations department:

To combat the dragon of television, which keeps millions of moviegoers at home, Film Magnate (sic) Spyros Skouras, president of 20th Century-Fox, has devised a big new weapon, a Swiss invention which takes a television signal from an electronic scanner and projects it onto a regular movie screen of any size. He hopes to get Eidophor machines installed in hundreds of theaters, then put on special sports events or fancy musical shows—"bringing Oklahoma! to Kansas"—which combine the glitter and polish of a Hollywood Technicolor production with the freshness of live action.⁹

Of course we don't expect a lightweight, graphics-oriented publication such as *Life* to provide critical evaluations of new technologies, but it is interesting to note the use of the trade name "Technicolor" in both articles. It is, in a sense, an invocation to a particular deity in the motion picture industry. Certain technical processes become symbolic of a standard of quality to which all competing technologies must measure up.

This dog-and-pony show strategy for the promotion of new technologies has become a familiar ritual of all the U.S. communications industries. For example, the color television "war" between CBS and NBC in the 1940-52 period was also marked by numerous public demonstra-

tions of the competing systems. What Fox was trying to do with their Eidophor demonstrations was to drum up support for the “public interest” value of frequency reservations for theater television. The petition for specific frequencies dedicated to theater television indicates that Fox and the other major producers/distributors (the petition was finally carried forward by the Motion Picture Association of America) wanted to have financial control of the distribution network instead of relying on leased lines from AT&T or other common carrier systems.

Fox, of course, had a special interest in the widespread application of theater television because of its control of the Eidophor patents. But the peculiar nature of Hollywood’s concept of “progress” dictated to a certain extent the eventual outcome of the Eidophor project in the 1950s. Janet Staiger has observed that the development of the Hollywood mode of production was shaped by what a “good film ought to look and sound like.” These standards are linked to Hollywood’s own version of “realism,” the verisimilar reproduction of “pure entertainment,” an obsession shared by the producers and their audience:

U.S. cinema’s technological research has consistently been aimed at “improving” its commitment to the standards of spectacle, verisimilitude, narrative clarity, and continuity. The innovation of synchronized sound, color, wide-screen, stereoscopy, and stereophony were seen as economically advantageous because they were perceived as progress. Hollywood’s discourse in its advertising and institutions set up a standard of the quality film. Technological innovations which would promote the attainment of that goal were institutionalized research aims. In a real sense, an

ideology of “progress”—of a very particular kind—led and controlled research. These aims marked the boundaries of desired changes. Certain technological innovations were all assumed from the earliest period to be nearly inevitable innovations in the product; when they would be economically and technically feasible was the only issue in doubt.¹⁰

But economic feasibility is not a simple matter. Color film processes existed from the first decade of the motion picture industry and were technically perfected long before they became the “norm” for Hollywood. As Gorham Kindem has persuasively demonstrated, the transition to predominantly color cinematography in Hollywood films during the 1960s was largely motivated by the growth of color television.¹¹ On the other hand, sound motion pictures were a comparative overnight sensation, despite the high costs of new production, processing, and exhibition equipment. In a strange way, sound was “more inevitable” than color in the motion picture industry. Electronic cinema as a “weapon against television” wielded by Paramount in 1948 or Fox in 1952 was simply not as inevitable as the myriad alternative schemes, such as Cinemascope, Cinerama, 3-D, and stereo sound, to bolster the sagging box office.

To the casual observer, the 1950s might be viewed as a time of much technological innovation in the motion picture industry; however, the fact is that most of the above-mentioned systems existed in prototype stage since the 1930s and those that succeeded in the long run were the most conservative innovations—Cinemascope and stereo sound. Richard Maltby has noted that, despite the “crap game” image of the industry nurtured by the producers for public consumption, most industry financial decisions were quite conservative. In fact, the major producer/distribu-

tors might be considered (in Las Vegas terms), “the House.” In the area of new technology,

The studios preferred to stick with a technologically inferior product as long as it could retain its commercial viability, rather than invest in research and possibly risky conversions to an improved system. Instead, they bought the rights to systems once they had been invented, and adopted major technological advances such as color and widescreen only when forced by external economic pressures, and only in order to reap what were generally regarded as short term benefits in increased or maintained audience size.¹²

To understand the motion picture industry’s attitude toward an innovation such as electronic cinema at any given time, it is essential to first understand the economic imperatives under which the major producer/distributors were (or are) operating. In the 1950s, the uneasy truce between the independent exhibitors (which gradually came to mean all exhibitors, under the compliance of the majors to the consent decrees), hardly provided fertile soil for a new system that sacrificed image quality for the “freshness of live action.” Both *Life* and *Newsweek* had blandly reported that the Eidophor could project its image “onto a regular movie screen of any size,” but any intelligent projectionist or theater manager was well aware that image definition decreases in direct proportion to increased screen size. The demonstration of the Eidophor was on an eleven-by-fifteen-foot screen, much smaller than the screens in the typical big-money houses of the major markets, not to mention the massive drive-in screens. The market trend in the 1950s was toward “blockbuster” films and accompanying saturation advertising campaigns designed to offer “what television could

not” and to recoup investments as quickly as possible to avoid excessive interest payments on bank loans taken to cover high production costs.¹³ Thus, the Eidophor in the 1950s was a rather classic example of innovation for the sake of short-term gains expected from the novelty of “live motion pictures.” Also, considering the forced divestiture of its most profitable operation—the theaters—Fox’s strategy was something of an “end run” designed to circumvent the terms of the consent decrees by establishing a pay-per-view closed-circuit television system that would enable Fox to maintain control of exhibition through rental of costly Eidophor equipment and interconnect facilities.

Although it is difficult to weigh economic considerations against aesthetic factors, electronic cinema was clearly a movement against the aesthetic drive toward increasing a new kind of “realism” prevalent in post-war Hollywood. In the area of production, lightweight cameras such as the Airiflex were just beginning to be widely accepted in the 1950s in Hollywood, greatly facilitating the location shooting that became a hallmark of such “realistic” classics as *The Naked City* (1948) and *On the Waterfront* (1954). And at the other end of the verisimilar scale lie the gaudy MGM Technicolor musicals of the same period. With bulky cameras, inadequate recording equipment, costly interconnect facilities, and inferior color projection equipment, theatrical television in the 1950s and (for the most part) ever since that time has been little more than a curious novelty occasionally used by promoters to provide closed-circuit coverage of singularly immediate events such as championship boxing matches.

Electronic Motion Pictures

In the two decades following the rather unsuccessful introduction of the Eidophor,

several halting steps were taken in the direction of electronic cinema. Videotape recording, editing, and playback equipment became more sophisticated and, in current computer jargon, more “user friendly” as well. In 1964, Electronovision Inc. began production of “tele-cines,” resurrecting the High-definition Films technique of multiple video cameras and film recording of a single master monitor. The most widely distributed product of this company was the low budget version of *Harlow* (1965), a film poorly received for its lack of pictorial quality, as well as for its “unethical” promotion.

Technically, this third Electronovision production—preceded by “Hamlet” and “The T.A.M.I. Story”—and first to be shot under controlled conditions on a motion picture soundstage, still presents many problems for improvement. Photography continues to be a major difficulty, grainy and of generally poor quality, and bad lighting heightens the effect of old-fashioned production. Filmed in eight days in the tv-type lensing process, picture very often looks it.¹⁴

Frank Zappa’s *200 Motels* (1971) and Fred Haines’ adaption of Hesse’s *Steppenwolf* (1974) both utilized videotape recording and tape-to-film transfers to produce theatrical motion pictures. Both films made excellent use of the sophisticated electronic special effects available in video production but neither film experienced the kind of stunning success of, say, a Technicolor *Gone with the Wind*, to justify large investment in video production equipment by the major motion picture production companies.¹⁵ *200 Motels* simply looked “schlocky” (perhaps a conscious artistic choice by iconoclast Zappa), a move against the Hollywood standards of visual quality. The movement toward electronic cinema needed a credible product as well as the proper market

conditions to make electronic cinema cost-effective.

Francis Ford Coppola established an electronic cinema division at Zoetrope Studios in 1981 to exploit various film/video combinations. He directed *One from the Heart* (1982) with the aid of sophisticated electronic systems that enabled him to edit on videotape. He then turned the tape over to a film editor who produced a 35mm film version of the tape using a special coding process that matched the video segments with their corresponding film segments. This system enabled Coppola to pre-visualize the film (by recording storyboards and rehearsals on videotape) and to easily produce preview versions for test screenings.¹⁶ Zoetrope was certainly not alone in exploring new cinema systems in 1981. Paramount established a New Technology Division to explore the cost-cutting potentials of “computer graphics, satellite distribution, digital editing, and high-resolution video.”¹⁷ But all Zoetrope’s superb technology intended to save production costs and facilitate previews could not save *One from the Heart* from its commercial and critical failures. In all fairness, it should be noted that the Coppola film was released hot on the heels of the commercial failure of Michael Cimino’s *Heaven’s Gate*. While Michael Cimino was being lambasted as Mr. Self-indulgent, Coppola was quickly gaining a critical reputation as “the-man-who-used-to-be-able-to-tell-a-story.” The director of the Venice International Film Festival perhaps best captured the essence of the film critics’ reactions to Coppola when he stated that cinema has reached a “critical stage.”

Because electronic progress, already well developed, is conjuring up new aesthetic and technical values but containing (sic) a threat to creative liberty and credibility. Electronics are

beautiful for filmmaking, but if more stress is placed on electronics than on the film, there is danger of falling victim to technology. I would like to avoid giving current examples but if I had to I could cite *Tron*. I could also cite Francis Ford Coppola, one of the outstanding contemporary filmmakers. In *One from the Heart* he achieved splendid technical efforts but in turn destroyed the story and its characters.¹⁸

This intellectual reaction against Coppola's latest films (including the subsequent *The Outsiders* and *Rumble Fish*) has not deterred him from plunging ahead into the uncharted waters of electronic cinema. In fact, he has presented testimony before U.S. House Subcommittee hearings voicing strong support for NHK's HDTV system, calling it "the missing link" toward an "ideal new medium."¹⁹

The Institutional Context of HDTV

This section is a summary statement of the factors leading to a convergence of film and video technologies as well as an assessment of the potential impact of electronic cinema within the industry. This is an attempt to place the recent proliferation of HDTV articles and promotion into a meaningful institutional context.

Beginning in 1967, NHK Technical Research Labs conducted research on an improved television system using a much higher number of scan lines per frame and pixels per line than conventional television. Throughout the 1970s, NHK Labs continued to develop this system, breaking the research down into a variety of sub-projects including work on television cameras, receiving sets, telecine (film chains), signal systems, videotape recorders, satellite transmission and reception, and laser-based tape-to-film

transfers. CBS, Inc., and a number of Japanese electronic manufacturers became involved in the HDTV project, leading to the eventual introduction of HDTV to the U.S. broadcasting and motion picture engineers and executives at the 1981 Convention of the Society of Motion Picture and Television Engineers (SMPTE). The system as demonstrated consisted of the minimum elements of a camera, a color signal multiplexer, a receiver, and monitor. In terms of resolution, the number of pixels per frame in the system was five times as great as in the standard U.S. picture. The image ratio more closely approximated that currently used in the motion picture industry, 1.66:1.

NHK's Takashi Fujio, director of the HDTV project, has taken a McLuhanesque approach in explaining the significance of HDTV:

Conventional TV systems fail to attain the level at which the functions of the human visual system can be effectively utilized. As a result, color TV cannot be compared with movies or printing in terms of picture clarity, impact, or immediacy. This is why conventional color TV cannot thoroughly provide a high level psychological satisfaction in terms of feelings and emotions. By displaying a clear picture in a wide visual field, the area of the picture display and the space consciousness of the viewer almost converge, and the sense of presence of the display system is reduced, while the pictures themselves are felt with depth and naturalness.²⁰

Fujio is proposing a new kind of home viewing experience; what McLuhan might have called "hot television." But if 35mm film already meets these psychological and aesthetic requirements, then there must be

more substantial reasons for producing motion pictures on tape rather than film. Perhaps the two most compelling reasons for this transition are: 1., changes in the market for motion picture entertainment, and 2., a somewhat redefined concept of compatibility.

Present market trends indicate that theatrical exhibition of motion pictures is increasingly becoming a "market test" for what have traditionally been considered "ancillary sales," i.e., pay cable, broadcast television, videocassettes, and video discs. Revenues in 1982 to motion picture production/distribution firms in the U.S. consisted in part of \$3.5 billion from theatrical releases and \$2.4 billion from rentals to pay television services.²¹

A report by the RCA Corporation predicts that by 1990, pay cable revenues will surpass theatrical box office by a margin of three to one.²²

In a market increasingly dominated by television in its proliferating formats, the question arises as to whether 35mm film provides the most versatile first generation copy from which to make cassettes and discs. At the production end, a transition to an electronic system would eliminate the physical process of splicing sections of film together. A final tape copy would merely be etched onto fine grain negative stock with a laser beam, presuming there was actually a need for 35mm copies. This need would depend on whether the exhibition end of the business would also switch over to electronic systems or stay with film projection. It was noted in the previous section that in the 1950s, patterns of exhibition mitigated against the Eidophor because the system was weakest in precisely those theaters that represented the most profitable part of the business—the grand old picture houses located in central urban areas, but in the 1970s, the mini-theaters grouped in complexes in shopping malls

began to take the lead in revenues. Many of these theaters had screens less than 25 feet wide, a significant down-scaling of audience expectations of spectacle and involvement. Such theaters present a golden opportunity for video projection of high-definition images. It is as if audience expectations and technological progress had met each other half-way. But such a radical and costly transformation of the projection process would hardly seem attractive to the majority of exhibitors who have sizable investments in 35mm projection equipment.

Yet the prediction of satellite-fed video motion pictures continues to pop up in the trade press, voiced by business analysts, labor leaders, and industry spokespersons.²³ Who will foot the bill for this expensive transformation? Precisely those companies that might have the most to gain—electronic equipment manufacturers and the major motion picture production/distribution companies. True, the producers are barred from entering the exhibition market under the terms of the 1948 consent decrees, but in this era of deregulation, the companies and their trade association are calling out for relief from the terms of those decrees.

One big question in the "satellite dish on top of every theater" scenario is the availability of sufficient spectrum space to accommodate a number of wide-band transmissions into a given area; however, if theaters were also equipped with HDTV video recorder/players, then the distributors could beam their transmissions during off hours, renting transponders for only brief periods of time. Sony has already sent up a trial balloon in Tokyo by leasing a "video theater system" to 200 situations located mostly in shopping malls. This Cine-matic system utilizes ¾-inch videocassettes with image resolution approaching HDTV standards.²⁴ The tapes are re-usable, unlike 35mm release

prints which cost around \$2,000 and which are eventually sold for a small fraction of their cost, or destroyed. Shuzo Nakamura of Sony's video theater division has stated that the 200 video theaters are "designed to supplement, not compete with, conventional film theaters," but this claim tells us little about the potential impact of such theaters in different markets. It is difficult to assess how electronic cinema might impact on a deregulated U.S. motion picture industry, but it is clear that the cost reductions involved in a completely vertically integrated electronic motion picture company would certainly provide a substantial competitive advantage to that company.

Electronic cinema's impact on motion picture workers and labor unions represents yet another significant factor in an analysis of HDTV's potential. In production, distribution, and exhibition, a number of jobs may be eliminated. Camera crew members, film lab workers, film exchange workers and projectionists (already disappearing in the wake of platter projection systems) are only the most obvious potential targets for management's cost-reduction plans. A motion picture production engineer foresees significant savings from the transition to electronic cinema, resulting from "reductions in crew size, coupled with lower film stock and post-production costs."²⁵

Since one of the primary tasks of a union is to provide some measure of job security to its members, there seems to be an inevitable conflict developing between motion picture unions and management over the adoption of new technologies. The situation is further complicated by the fact that production on videotape has traditionally been claimed by the National Association of Broadcast Employees and Technicians (NABET) while film production jurisdiction has been dominated by the International Alliance of Theatrical

and Stage Employees (IATSE).²⁶ Historically, union struggles such as the one that could develop over jurisdiction of electronic cinema production have not benefited worker welfare. There is a certain amount of prudent rank-and-file fear that their union representatives might barter away job security or wages for certain members in order to "get a foot in the door" of electronic cinema. Hence, calls for a merger of East Coast IATSE and NABET production locals come as no surprise. If such a merger fails to take place before the widespread transition to electronic cinema, the lower wage rates and more flexible working arrangements of NABET may become the bottom line for all motion picture workers, regardless of union affiliation. As in so many other sub-plots of this history and analysis, the financial advantages from a union jurisdictional war would, in the long run, accrue to the major motion picture production/distribution companies.

Finally, there is the potential in an electronic production system to radically change the way location shooting is conducted. Coppola has suggested that,

In this day and age, you don't have to be in one place by any means. A man like (Fox's chairman) Marvin Davis, with his vast resources, could have a studio here and a studio there, and have them linked by satellite and shift images back and forth just like the mail.²⁷

As preposterous as such an idea may sound, there may be substantial long-term financial advantages in such a satellite production system, particularly considering the costly "bicycling" system currently used by the major producers on location shooting.

Boldly Into The Amorphous Future

There is a growing consensus in both the

professional and academic film communities that the formerly sharp boundaries between the motion picture and broadcasting industries are beginning to dissolve from the impact of market forces, new aesthetics born in the strange cultural brew of MTV and *Flashdance*, and as this paper suggests, from new technology such as HDTV. The applications of HDTV not discussed in this paper, including satellite and cable transmission of HDTV signals to home receivers, teleconferencing, computer displays, facsimile transmission, and in the area of printing all add up to what NHK calls an "all-imaging system." This concept refers to a "universal production medium" for all visual telecommunication systems. To consider "electronic motion pictures" decontextualized from this larger story is a somewhat artificial exercise, but it is hoped that this small bit of film history does shed some additional light on Hollywood's concepts of innovation and "progress," particularly in the complex context of corporate strategies.

Electronic motion picture systems will probably be gradually introduced, first in hybrid forms such as Zoetrope's Electronic Cinema Division. The motion picture is a quirky commodity but it is a commodity nonetheless. Efficiencies in division of labor and technological innovations have been welcomed by the major motion picture companies from the earliest days of the industry. From rumblings in the trade press in recent years, it seems that electronic cinema is, in Janet Staiger's terms, one of those "inevitable innovations." The technical basis of HDTV seems assured. All that remains is for the equipment manufacturers to set their prices. Then, the producers will get out their calculators and attempt to assess electronic cinema's economic feasibility. Exhibitors will resist video projection unless the producer/distributors are willing to spread their savings around in the form of better contract terms. If the terms

of the 1948 consent decrees are renegotiated (perhaps as part of a package deal involving syndication rights for television programs), the exhibitors may be forced into video projection to effectively compete with vertically integrated electronic motion picture companies. For motion picture workers and their unions, electronic cinema offers more trouble than opportunity, notwithstanding the videotape training programs of IATSE and the merger proposals of NABET. To make electronic cinema work, management is going to call for reductions in work force all along the chain, from camera crew to projectionists, making their most devastating cuts in the film labs and film exchanges.

Satellites and HDTV are *very* costly and their applications to motion picture production distribution and exhibition may eventually eliminate the more marginal segments of the industry. On the plus side, however, the flexibility and as yet undefined aesthetic potentials of electronic cinema may offer simply an *alternative* to traditional filmmaking and, for the consumer, a new aesthetic experience—the electronic movie.

Author's note: grateful acknowledgement is given to Professor Thomas Guback of the Institute of Communications Research, University of Illinois, and to James Carey, Dean of the College of Communications, University of Illinois, for their helpful comments on an earlier version of this article.

Notes

¹For those interested in reading further about the Sony HDTV system, please consult the following sources: *New Scientist*, 23 September 1982, "Japan beats the world to high-definition TV," p. 834; *SMPTE Journal*, May 1982, "High-Definition Television Systems," pp.

458-9; *SMPTE Journal*, December 1982, "HDTV standards consideration for electronic cinematography and post-production," pp. 1153-7; *Popular Science*, November 1981, "High-resolution TV," pp. 108-10; *PhotoGraphic*, October 1981, "The future of moving pictures," p. 14; *Electronics*, 29 December, 1982, "High-definition TV still on hold"; *High Technology*, July 1983, "High-definition TV comes at high cost," pp. 45-8; numerous articles in *Broadcasting*, March 1981-present, especially "Sony does it again in HDTV," May 4, 1981, p. 29., "The brave new world of HDTV," February 1, 1982, pp. 82-6., "The mood of Montreux: pressing for a world HDTV standard," June 6, 1983, pp. 37-9. For extensive technical descriptions of HDTV technology, consult *NHK Technical Monograph*, number 32, June 1982, available from Research and Information Services Division of the NHK Technical Research Laboratories, 1-10-11, Kinuta, Setagaya-ku, Tokyo 157, Japan. For references on motion picture production with HDTV see: "Making video movies at Zoetrope Studios," Michael Lehmann, *Intermedia*, May 1982, p. 35; and "Production experience with High-definition Television," Richard R. Green and Dwight F. Morss III, *SMPTE Journal*, February 1984, pp. 169-74. For an excellent in-depth history of the progression towards electronic cinema, see: E. P. Kenneth Hoffman, "The Impact of Television Production on Motion Picture Production." (New York University: unpublished Ph.D. dissertation, 1982).

²References on electronic cinema are frequently buried in articles about seemingly unrelated subjects. See "Markets cue new media labels," Lawrence Cohn, *Variety*, October 26, 1983, pp. 1,364; "New York Editors 771 reach interim accord with majors," Sharon Lee Douber, *Hollywood Reporter*, June 6, 1983, p. 3.

³Albert Abramson, *Electronic Motion Pictures*. (Berkeley, CA: University of California Press, 1955) pp. 58-61.

⁴*Ibid*, p. 172.

⁵*Ibid*, p. 177.

⁶*Ibid*

⁷Eric Smoodin has detailed Hollywood's early forays into television in "Motion Pictures and Television, 1930-1945: a pre-history of the relations between the two media," *JUFVA*, 34,3, Summer 1982. This article suggests that Paramount and the other major film producer/distributors were regulated out of the theatrical television business. It could be argued that the FCC's denial of Twentieth Century-Fox's application for frequency reservations for

wideband transmission of theatrical television forced Fox to lease facilities from AT&T. This may have made theatrical television less financially attractive. My later observations about the "corporate context" of technological progress should be read with the awareness that there was a *limited* amount of government intervention in the theatrical television market. However, the FCC in no way *blocked* theatrical television. See the dissenting opinion by Commissioner Hennock in FCC Report and Order: "Allocation of frequencies for theater television service," Pike and Fisher, Series 1, Volume 9, Rules and Regulations, p. 1528, July 1, 1953.

⁸*Newsweek*, July 7, 1952.

⁹*Life*, October 6, 1952.

¹⁰Janet Staiger, *The Hollywood Mode of Production*. (Madison, WI: unpublished dissertation, 1981) p. 216.

¹¹Gorham Kindem, "Hollywood's Conversion to Color," in *Journal of the University Film and Video Association*, Volume 31, Number 2, 1979, pp. 29-36.

¹²Richard Maltby, *Harmless Entertainment*. (Methuchen, NJ: Scarecrow, 1983) p. 59.

¹³Fredric Stuart, *The Effects of Television on the Motion Picture and Radio Industries*. New York: Arno Press, 1976, pp. 56-9.

¹⁴*Harlow* film review, *Variety*, May 19, 1965, p. 6. Joseph Levine had been in production with an Embassy Pictures version of *Harlow* several months prior to the start-up of the Electronovision version. Electronovision's "quicky" version beat Embassy to the market by about three weeks but the resultant bad publicity greatly contributed to the subsequent bankruptcy of Electronovision four months later. "Bloody pink Harlow war," Ronald Gold, *Variety*, May 5, 1965, p. 5.

¹⁵Fredric Stuart (op cit, p. 61) notes that *The Robe* is a good example of a high quality film supporting the introduction of a new motion picture system—Cinemascope. For the fates of several tape-to-film projects, see "Markets cue new media labels," op cit, p. 364.

¹⁶Mike Bygrave and Joan Goodman, "Meet Me in Las Vegas," in *American Film*, October, 1981, pp. 38-43.

¹⁷*Variety*, October 14, 1981, p. 5. In attempting to discover what the Paramount New Technology Division was doing in the Summer of 1983, I was told by a receptionist at Paramount that no such division exists. Repeated attempts to contact Paramount's engineering department have thus far proven fruitless.

¹⁸"Venice, the filmmakers festival, keeps technology in perspective," Gian Luigi Rondi, *Variety*, August 31, 1983, p. 43.

(continued on page 72)

(continued from page 20)

llour's work on film, and a discussion of its usefulness to feminist theory.)

¹⁸ Neale, p. 25.

¹⁹ See especially Rick Altman, ed. *Genre: The Musical* (London: Routledge & Kegan Paul, 1981), and Jane Feuer, *The Hollywood Musical* (Bloomington: Indiana University Press, 1982).

(continued from page 30)

spectator's field of view were used for assessing the viewing angle of the 35mm theatrical presentation and for conventional television viewing. Ben Schlanger, "Criteria for Motion-Picture Viewing and for a New 70mm System: Its Process and Viewing Arrangements," *SMPTE Journal* 75 (1966): Figure 1, p. 162. The 30° field of view utilized for 35mm theatrical exhibition (the general target for HDTV) was used for determining the spectator's field of view encompassed in a home HDTV display.

⁵¹ Greg MacGillivray and Jim Freeman, "Producing the Imax Motion Picture: 'To Fly,'" *American Cinematographer* 57 (1976): 751-752, 808; Englund, interview.

⁵² While the wide-screen film formats such as Cinerama and CinemaScope do require (in certain houses) horizontal head and eye movements in order to watch the drama on the screen, there is no required vertical movement for the spectator as there is in viewing a large-screen film and in normal, everyday visual experience.

⁵³ Hatada, Sakata, and Kusaka, p. 568.

⁵⁴ Bridge, interview.

⁵⁵ Ibid.

⁵⁶ Hooten, 1983 telephone interview.

⁵⁷ Telephone interview with Saul Swimmer, President of MobileVision Technology Inc., 30 August 1983.

⁵⁸ Alan Collins, "Letter from Toronto: IMAX—Five Years After," *Take One*, June 1975, pp. 36, 37; Bridge, interview.

⁵⁹ Englund, interview.

⁶⁰ Hooten, 1983 telephone interview.

⁶¹ Harrington, p. 87.

⁶² Telephone interview with Donald Weed, 30 August 1983.

(continued from page 42)

¹⁹ "The Brave New World of HDTV," *Broadcasting*, February 1, 1982, p. 84.

²⁰ Takashi Fujio, "Future broadcasting and high-definition television," in *High-Definition Television*. Tokyo: NHK Technical Monograph number 32, June, 1982. p. 7.

²¹ *Hollywood Reporter*, July 20, 1983, p. 1,16.

²² RCA Corporation Annual Report, f.y. 1982, cited in *Box Office*, June 1983, p. 37. As an additional confirmation of the theatrical vs. pay video figures, consult MGM/UA's annual report, f.y. 1983, pp. 28-9. Over the past five years, revenue from theatrical distribution has jumped from \$63 million to \$260 million; for home video and pay tv in the same period, the jump was from \$3 million to \$144 million.

²³ For example, see "Beam me up to the booth, Scotty," Gary Fisher, *Box Office*, March 1984, pp. 44-6, and "Onrush of satellite technology occupiees world television community," *Broadcasting*, March 14, 1983—see especially the comments of Joseph Pelton, p. 166.

²⁴ *Variety*, September 7, 1983, p. 3

²⁵ "The Brave New World of HDTV," op cit, p. 84.

²⁶ "Spectre of labor unrest looms in videotape future: Aldrich," *Hollywood Reporter*, October 23, 1981, pp. 1,13.

²⁷ "Francis Ford Coppola Interview," Jeffery Wells, *Film Journal*, September 21, 1981, p. 9.

(continued from page 49)

looks quite good when viewed on a tube, but its video image in no sense compares favorably with that of film. There are even some electronic engineers who argue, privately, that electronic imaging will never compare favorably with that of photochemical systems. We will see. Whatever the system which ultimately emerges, it will most likely be one which has benefited from the pioneering work of Coppola and his associates at Zoetrope Studios.